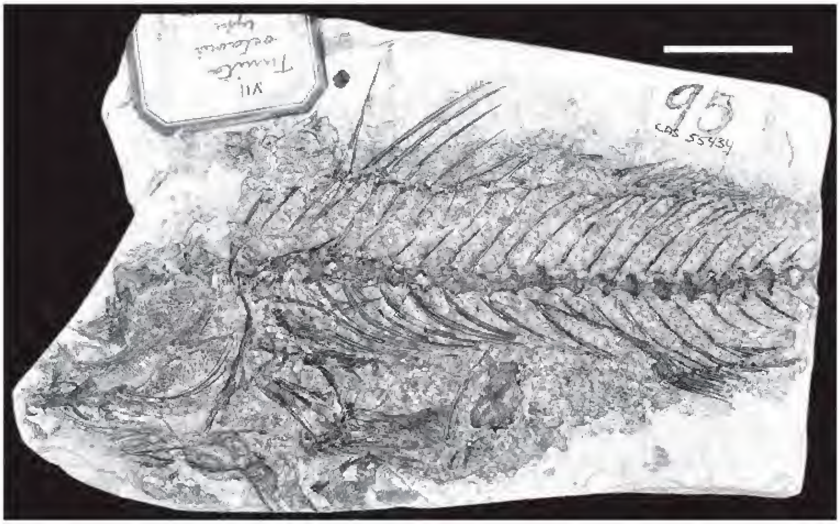
OCCASIONAL PAPERS
OF THE
CALIFORNIA ACADEMY OF SCIENCES

No. 159 January 20, 2012

CATALOG OF THE NEOGENE BONY FISHES OF CALIFORNIA

A SYSTEMATIC INVENTORY OF ALL PUBLISHED ACCOUNTS



Harry L. Fierstine, Richard W. Huddleston, and Gary T. Takeuchi

California Academy of Sciences
San Francisco, California
2012

Cover image

†*Tunita octavia* Jordan and Gilbert 1919a, holotype
(see p. 150 for details)

SCIENTIFIC PUBLICATIONS

Alan E. Leviton, Ph.D., *Editor*
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ISSN 0068-5461

Printed in the United States of America
Allen Press, Lawrence, Kansas 66044

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Catalog of the Neogene Bony Fishes of California

A Systematic Inventory of All Published Accounts

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Table of Contents

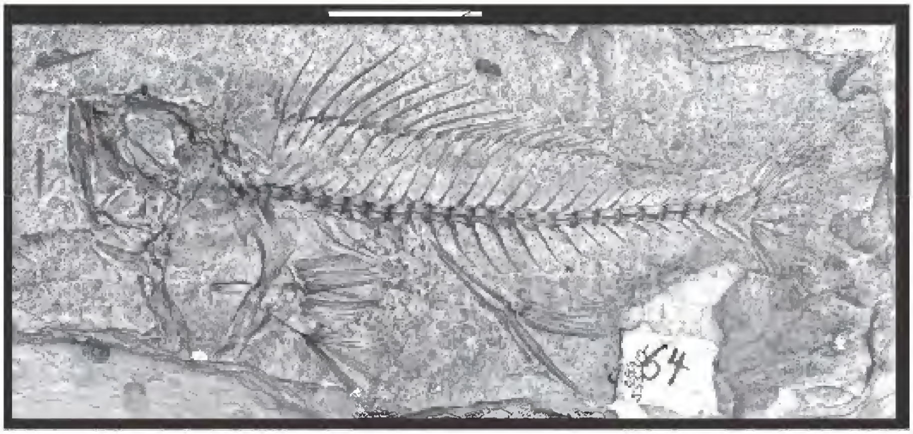
INTRODUCTION 7
ACKNOWLEDGMENTS 9
ABBREVIATIONS 9
SYSTEMATIC INVENTORY 11
  Class **Actinopterygii** 11
    Subclass **Chondrostei** 11
      Order **Acipenseriformes** 11
          Family **Acipenseridae** 11
    Subclass **Neopterygii** 12
      Division **Teleostei** 12
        Order **Elopiformes** 12
          Family **Elopidae** 12
          Family **Megalopidae** 12
        Order **Anguilliformes** 13
          Family **Muraenidae** 13
          Family **†Deprandidae** 13
        Order **Albuliformes** 13
          Family **Halosauridae** 13
        Order **Clupeiformes** 15
          Family **Engraulidae** 15
          Family **Clupeidae** 16
        Order **Cypriniformes** 30
          Family **Catostomidae** 30
          Family **Cyprinidae** 34
        Order **Argentiniformes** 38
          Family **Argentinidae** 38
          Family **Microstomatidae** 38
        Order **Salmoniformes** 42
          Family **Osmeridae** 42
          Family **Salmonidae** 42
        Order **Stomiiformes** 45
          Family **Gonostomatidae** 45
          Family **Sternoptychidae** 47

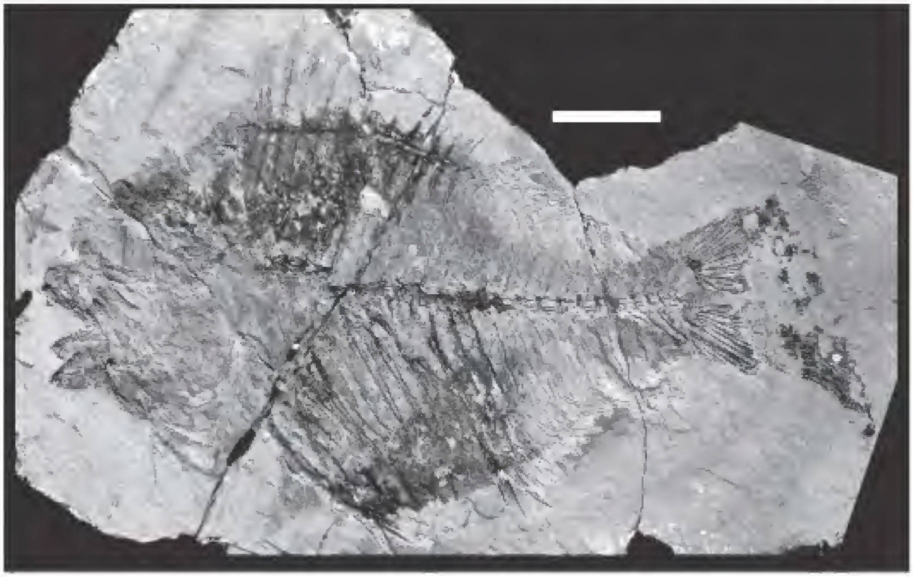
Family **Stomiidae** 48
Order **Aulopiformes** 50
Family **Paralepidae** 50
Order **Myctophiformes** 50
Family **Myctophidae** 50
Order **Lampriformes** 58
Family **Lampridae** 58
Order **Gadiformes** 60
Family **Moridae** 60
Family **Macrouridae** 67
Family **Merlucciidae** 68
Family **Gadidae** 70
Order **Ophidiiformes** 75
Family **Bythitidae** 75
Family **Ophidiidae** 75
Order **Batrachoidiformes** 77
Family **Batrachoididae** 77
Order **Lophiiformes** 78
Family **Lophiidae** 78
Family **Oneirodidae** 80
Family **Linophrynidae** 80
Order **Mugiliformes** 81
Family **Mugilidae** 81
Order **Atheriniformes** 81
Family **Atherinopsidae** 81
Order **Beloniformes** 84
Family **Hemiramphidae** 84
Family **Scomberosocidae** 86
Family **†Forficidae** 87
Order **Cyprinodontiformes** 88
Family **Fundulidae** 88
Family **Goodeidae** 89
Order **Stephanoberyciformes** 90
Family **Melamphaidae** 90
Order **Gasterosteiformes** 91
Family **Gasterosteidae** 91
Family **Syngnathidae** 92
Order **Scorpaeniformes** 96
Family **Scorpaenidae** 96
Family **Anoplopomatidae** 106
Family **Hexagrammidae** 107
Family **Cottidae** 108
Family **Psychrolutidae** 112
Order **Perciformes** 113
Family **Serranidae** 113
Family **Centrarchidae** 114
Family **Apogonidae** 114
Family **Pomatomidae** 115
Family **Carangidae** 117
Family **Caristiidae** 119
Family **Sparidae** 121

Family **Sciaenidae** 124
Family **†Ioscionidae** 132
Family **Embiotocidae** 132
Family **Labridae** 135
Family **Bathymasteridae** 136
Family **Zoarcidae** 137
Family **Cryptacanthodidae** 137
Family **Zaproridae** 138
Family **Ammodytidae** 139
Family **Gobiesocidae** 139
Family **Gobiidae** 139
Family **†Euzaphlegidae** 141
Family **Sphyraenidae** 144
Family **Scombridae** 145
Family **Istiophoridae** 154
Order **Pleuronectiformes** 156
Family **Paralichthyidae** 156
Family **Pleuronectidae** 160
Family **Cynoglossidae** 163
Order **Tetraodontiformes** 163
Family **Balistidae** 163
Family **Tetraodontidae** 164
Family **Molidae** 164

ERRONEOUS ACCOUNTS 164
Order **Cypriniformes** 164
Family **Cyprinidae** 164
Order **Myctophiformes** 165
Family **Myctophidae** 165
Order **Cyprinodontiformes** 166
Family **Fundulidae** 166
Order **Stephanoberyciformes** 167
Family **Melamphaidae** 167
Order **Gasterosteiformes** 167
Family **Gasterosteidae** 167
Order **Scorpaeniformes** 168
Family **Scorpaenidae** 168
Family **Cottidae** 168
Order **Perciformes** 169
Family **Apogonidae** 169
Family **Gobiidae** 169
Order **Pleuronectiformes** 169
Family **Pleuronectidae** 169

LITERATURE CITED 171
APPENDIX 183
SYSTEMATIC INDEX 193
GEOGRAPHIC AND STRATIGRAPHIC INDEX 203





ABOVE: †*Sebastes* ***defunctus*** Barsukov 1989, holotype, CAS 55542 (see p. 98)
BELOW: †***Rythmias gaviotae*** David 1943, holotype, LACM (CIT) 10154 (see p. 124)

INTRODUCTION

Background

Although California is favored with Neogene[1] strata containing abundant bony fish remains, study of the specimens has resulted in surprisingly few publications. Initially, David Starr Jordan (often with his coworker James Z. Gilbert) published 14 papers on the California fauna in the early 1900s (see references in Literature Cited), followed by a more modern synopsis of the California fauna by Lore David in 1943 (a study introduced in two abstracts published in 1939 [see references in Literature Cited]). Most of Jordan's specimens were deposited at Stanford University, a collection that later was transferred to the Geology Department of the California Academy of Sciences (Firby 1972). Jordan's papers are very important, but probably because of his time-consuming administrative duties and immersion in studies of Recent fishes, his articles on fossil fishes have errors (e.g., mislabeled figures, questionable identifications of poorly preserved specimens, and inaccurate locality data, both geographical and geological). Unfortunately, the whereabouts of many of his specimens are unknown. David (1943) examined Jordan's specimens and numerous others in the collection of the California Institute of Technology (CIT). In 1957, the CIT collection was sold to the Natural History Museum of Los Angeles County (LACM). Although David's treatise contained fewer errors than Jordan's papers, she also included data from uncatalogued specimens, many of which were from private collections that now are lost from scientific scrutiny. Her 1943 synopsis contained six parts, each written at different times, but published together as a single unit. Sometimes an identification in one part differed from an identification in another part.

From 1943 to the present, there have been approximately 75 published accounts, mostly based on newly collected specimens belonging to taxa new to the California Neogene. Two recent areas of research are especially notable. As part of a study of the evolution of Great Basin fishes, Robert R. Miller, usually with coauthors, gave the first meaningful insight into fishes inhabiting the freshwater environments of California during the Neogene (e.g., Miller 1945, Uyeno and Miller 1962 and 1963, Miller and Smith 1967, 1981; see additional references in Literature Cited). In the second area of research, John Fitch and coauthors (see references in Literature Cited) identified numerous taxa on the basis of fossil otoliths and demonstrated that many of these fishes are extant. Unfortunately, Fitch often failed to give locality numbers, never gave specimen numbers, and in some cases described sites as Pliocene that are now considered Pleistocene. His untimely death in 1982 left various unfinished projects. His otolith collection, manuscripts, library, and correspondance were donated to LACM (Fitch and Lavenberg 1983). Fitch's otolith collection is housed in two departments at LACM, the recent specimens in Ichthyology and Herpetology and the fossil specimens in Vertebrate Paleontology.

Purpose

The present catalog provides a systematic inventory of all known published accounts of the Neogene bony fishes of California. Our goal is to furnish a single source to reduce the clerical effort and detective work for future workers (references, locality and specimen numbers, disposition of the specimens, etc.). Each taxon is based on information presented by the last reviser. We have not attempted to reidentify any of the specimens. For each named species, the catalog lists current museum number(s) for specimens assigned to that species (some of the numbers have changed), a brief description of the gross morphology, and the most accurate locality data available (number, geographical setting, formation, and age). In some cases, especially for specimens studied by Jordan and collaborators, no locality numbers were ever assigned and we only list the locality name (e.g., Lompoc).

Because the catalog focuses on published accounts and avoids making systematic revisions, we follow the same philosophy for stratigraphic units. However, acceptance of a particular unit may vary among geologists, paleontologists, and locality databases, and this lack of unanimity forces us to make a choice. The Fernando Formation in the Los Angeles Basin and vicinity is an excellent example of this confusion (see discussion in Durham and Yerkes 1964). In the downtown Los Angeles area, Dibblee (1989, 1991) recognized a marine claystone as the Repetto Member of the Fernando Formation whereas in the vicinity of the Palos Verdes Peninsula, Dibblee (1999) divided the Fernando Formation into a Late Pliocene upper unit, the Pico Member, and a lower unnamed unit of early Pliocene age. In the northern Santa Ana Mountains, Schoellhamer et al. (1981) recognized the Fernando Formation to be formed of two unnamed units, a lower member of early Pliocene age and an upper member of Late Pliocene age. In his analysis of the eastern Ventura (Ridge) Basin, Crowell (2003) followed Yeats et al. (1994) and assigned the name Fernando Formation to what was formerly called Pico Formation by Winterer and Durham (1962). Squires et al. (2006) recognized the Pico Formation as a Late Pliocene unit in the Ventura Basin and made no mention of the Fernando Formation. As a compromise, we follow Blake (1991) and recognize the Fernando, Pico, and Repetto Formations as separate units in the Los Angeles Basin and vicinity.

---

[1] We follow the International Commission on Stratigraphy (2011) and define the Neogene as a geologic period or system that is subdivided into two epochs, the Miocene (ca. 23-5.3 Ma) and Pliocene (ca. 5.3-2.6 Ma).

The accepted age of a stratigraphic unit often changes after further study of its fossil content, lithology, geopolarity, etc. We take a conservative approach and give an age range (e.g., Plio-Pleistocene) when there is ambiguity in the literature, or if the unit was deposited over more than one epoch and we are not sure in which part of the unit the fossil fish was collected. In general, we follow Blake (1991) for the chronostratigraphy of the Los Angles Basin and vicinity.

Organization of the Catalog

With few exceptions, we have followed the systematic classification presented by Nelson (2006). The exceptions usually include a revised classification based on new molecular evidence (e.g., placing billfishes in the Xiphioidei rather than Scombroidei).

Each species account contains a selected synonymy and references, brief description and museum number for the holotype (and paratypes, if named), the type locality (locality number, geographical setting, geological formation, and age), all referred specimens with locality data taken from each author listed in the synonymy and references, and a general remarks section. We provide a photograph of each fossil holotype, if its whereabouts is known, but do not include photographs of extant holotypes. Because some workers assigned a taxon to a different family than the one to which we assign it in this catalog, we have included the original family designation in bold (e.g., **Cybiidae**) at the end of each author's entry.

Institutional abbreviations are defined on page nine and then the abbreviations are used throughout the document. An Appendix that consists of a catalog summary in tabular form follows the literature cited. Geographic, stratigraphic and systematic indices are provided.

Catalog Summary

The specimens in the catalog represent 26 orders, 74 families, 176 genera, and 214 species (Appendix). Some published accounts only identified the specimens to order and family (e.g., Acipenseriformes, Acipenseridae) and other accounts to order, family, and genus (e.g., Clupeiformes, Clupeidae, †Etringus). Most taxa are identified to order, family, genus, and species (e.g., Albuliformes, Halosauridae, †*Laytonia californica* David), although a few are identified as a species-like taxon (e.g., Cypriniformes, Catostomidae, *Chamistes* cf. *C. cujus* Cope).

Seventy of the fossil holotypes are housed at CAS, 28 at LACM, and five in four institutions outside of California. Twenty-one of the fossil holotypes and 145 of the referred specimens are lost or misplaced (designated as 'whereabouts unknown'). Most of the latter specimens were studied by Jordan and/or Gilbert and/or David. They were part of the Stanford University collection then, but we do not know whether they were lost in transit to CAS or if they were ever included in the donation.

Of 170 taxa that were collected in Miocene or Mio-Pliocene strata, only six are extant. In contrast, of the 74 taxa that were collected in Pliocene and Plio-Pleistocene strata, 45 are extant. Two hundred and fifty-four taxa were collected in marine deposits, whereas only 28 taxa were found in freshwater deposits. Only one species, ***Gasterosteus aculeatus*** Linnaeus, was collected in both freshwater and marine deposits. One hundred and thirty-four taxa were identified from imprints (counterparts), 84 from otoliths, 44 from scales, 26 from bones, and eight from teeth. Twenty-eight taxa were identified from a combination of elements (e.g., counterparts and otoliths, or counterparts and scales, or scales and otoliths, etc.).

ACKNOWLEDGMENTS

Ortwin Schultz (NHMW) unwittingly provided the impetus for us to pursue this project. He mentioned he had assembled a catalog of the Austrian Neogene bivalves and was in the process of doing the same thing for bony fishes. After he sent us a sample of his effort, we were very impressed and knew a similar catalog would be useful to scientists who wanted to know more about the bony fishes from the California Neogene but also related stratigraphy.

Several people helped us obtain literature and also reviewed portions of the catalog in their specific areas of interest. Michael Bell (SUNY Stony Brook) was most helpful with the family Gasterosteidae, Gerald Smith (UMMP) with the Salmonidae, and Kenneth Gobalet (CSU Bakersfield) with the Cyprinidae and Catostomidae.

John Barron (USGS) provided literature on the biostratigraphy of the Lompoc deposit and Michel Housemann (World Minerals Corp.) gave us a guided tour of the Celite Quarry at Lompoc. Angela Jayko (USGS) sent literature that helped us understand the paleogeography and age of the deposits in the Mono Basin and its relationship to the deposits in the Owens Valley. Charles Powell, III (USGS) and Rob Weems (USGS) answered our questions on the USGS localities, and Philip Hogan (Fugro, Inc.), Richard Squires (CSUN) and Lindsey Groves (LACM) shared their interpretations of the age and geographic distribution of the Fernando Formation.

We are thankful that Robert Boessenecker (MSU), Giorgio Carnevale (Università di Pisa), David Catania (CAS), Robert Purdy and Mark Florence (USNM), Casey McKinney and Charles Powell, III (USGS), Ken Gobalet (CSU Bakersfield), Andrew Kinziger (HSU), James Knight (SC State Museum), J.D. Stewart (URS Corp.), Mark Roeder (SDNHM), Richard Feeney, Jeff Seigel, Vanessa Rhue, and Sam McLeod (LACM), Gerald Smith (UMMP), and Mary Burridge and Kevin Seymour (ROM) took time to answer our numerous emails concerning the whereabouts of specimens, people or literature.

Jean DeMouthe (CAS), Sam McLeod (LACM), and Paul Collins (SBMNH) gave us access to the fossil fish collection in their respective institutions and each provided printouts of their respective specimen catalog. Harry Filkorn (LACM) provided us information on LACMIP localities. Patricia Holroyd (UCMP) helped us access UCMP's online catalog and Gregg Gunnell (UMMP) sent us a listing of the bony fishes from the California Neogene in the UMMP collection. Edward Davis (UO), Sara Mansfield (CAS), Michael Brett-Surman (USNM), Christopher Norris and Marilyn Fox (YPM), Gerald Smith (UMMP), and John Maisey, Lorraine Meeker, and Chester Tarka (AMNH) provided the high resolution photos that are included in the catalog. We doubt the catalog would have been completed without their assistance.

The Cal Poly University Library deserves special recognition for its assistance. The Interlibrary Loan Department provided a simple and seamless method for obtaining numerous publications not housed in the university collection, and the science librarian, Jeanine Scaramozzino, somehow was able to obtain publications even though we could only provide her with incomplete citations.

This catalog owes so much to Alan Leviton, editor of the Academy's *Occasional Papers* series. His seemingly tireless work ethic and editorial skills gently guided us toward a more readable and useful publication. And, penultimately, to those of you who reviewed parts or all of the pre-publication version of the paper, Michele Aldrich, William Eschmeyer, Tomio Iwamoto, John McCosker, Peter Rodda, Peter Roopnarine, and Gary Williams, thank you for your thoughtful comments.

Last but not least, H. Fierstine acknowledges the support and encouragement of his wife, A. Fierstine, who listened to him chatter on and on about various issues while assembling the catalog, but never once rolled her eyes, a true act of composure and patience.

ABBREVIATIONS

ABDSP—Anza-Borrego Desert State Park, Borrego Springs, California.
AMNH—American Museum of Natural History, New York, New York.
ANSP—Academy of Natural Science, Philadelphia, Pennsylvania.
BMNH—The Natural History Museum, London, England.

CAS—California Academy of Sciences, San Francisco, California.
CIT—California Institute of Technology, Pasadena, California.
CSUN—California State University, Northridge, California.
FMNH—Field Museum of Natural History, Chicago, Illinois.
LACM—Natural History Museum of Los Angeles County, Los Angeles, California.
LACM (CIT)—California Institute of Technology, Pasadena; collections and records now held by Natural History Museum of Los Angeles County, Los Angeles, California.
LACMIP—Natural History Museum of Los Angeles County, Invertebrate Paleontology Section, Los Angeles, California.
LAV—Unknown institutional abbreviation.
LC—Ralph B. Clark Interpretive Center, Buena Park, Orange County, California.
MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.
MNHN—Múseum national d'Histoire naturelle, Paris, France.
MSU—Montana State University, Bozeman, Montana.
NMW—Naturhistorisches Museum, Wien, Austria.
OCPC—Orange County Paleontology Collection, Santa Ana, California.
PIN—Paleontological Institute, Russian Academy of Sciences, Moscow, Russia.
ROM—Royal Ontario Museum, Toronto, Ontario, Canada.
SBCM—San Bernardino County Museum, Redlands, California.
SBMNH—Santa Barbara Museum of Natural History, Santa Barbara, California.
SDNHM—San Diego Natural History Museum, San Diego, California.
SIO—Marine Vertebrate Collection, Scripps Institute of Oceanography, La Jolla, California.
SU—Stanford University, Palo Alto, California; collections and records now held by the California Academy of Sciences, San Francisco, California.
UCLA—Department of Geology, University of California, Los Angeles, California.
UCMP—University of California Museum of Paleontology, University of California, Berkeley, California.
UCR—Department of Geological Sciences, University of California, Riverside, California.
UMMP—University of Michigan Museum of Paleontology, University of Michigan, Ann Arbor, Michigan.
UMMZ—University of Michigan Museum of Zoology, University of Michigan, Ann Arbor, Michigan.
UO- University of Oregon Museum of Natural and Cultural History, University of Oregon, Eugene, Oregon.
USC—Department of Geology, University of Southern California, Los Angeles, California.
USGS—United States Geological Survey, Menlo Park, CA for localities preceeded by an M, and Reston, Virginia for others.
USNM—United States National Museum of Natural History, Washington, D.C.
YPM—Division of Vertebrate Paleontology, Peabody Museum of Natural History, Yale University, New Haven, Connecticut.
ZMB—Universitat Humboldt, Museum für Naturkunde, Berlin, Germany.
†—extinct

SYSTEMATIC INVENTORY

Class **Actinopterygii**
Subclass **Chondrostei**
Order **Acipenseriformes**

Family **Acipenseridae** (*sensu* Bemis et al. 1997)

Acipenseridae genus and species undetermined

Referred Specimens in Hilton and Grande (2006:680, text-fig. 7): From LACM locality 3386, 'Little Crab Canyon', Round Mountain Silt, marine, Middle Miocene, Bakersfield, Kern County; LACM 47035, scute, and an uncatalogued scute.

From LACM locality 4280, 'Sharktooth Hill', Round Mountain Silt, marine, Middle Miocene, Bakersfield, Kern County; LACM 115197, median fin fulcrum or scute.

From LACM locality 3499, 'Vertebra Hill', Round Mountain Silt, marine, Middle Miocene, Bakersfield, Kern County; LACM 97596, dermal bone (possibly part of the dermopterotic).

From LACM locality 6688, 'Bonanza Point', Round Mountain Silt, marine, Middle Miocene, Bakersfield, Kern County; uncatalogued lateral scute.

From LACM locality 7501, 'Mission Viejo Sturgeon', Monterey Formation, marine, Early to Late Miocene, Mission Viejo, Orange County; LACM 150079, disarticulated partial skeleton, including portions of the hyoid and opercular series, scutes, axial elements, pectoral girdle, and fin rays (Hilton and Grande 2006, fig. 7).

From LACM locality 6906, 'Autonetics 6', Monterey Formation, marine, Early to Late Miocene, Laguna Niguel, Orange County; LACM 40166, scute).

From LC locality 845, Puente Formation, marine, Late Miocene, Orange County; LC 3819 a, b, subopercle (part and counterpart).

From LACM locality 3221, 'El Toro Materials', Oso Sand Member, Capistrano Formation, marine, Late Miocene to Early Pliocene, Orange County; LACM 40154, scute, and LACM 50601, 40155, 50662, and 40736 (all dermal bone fragments).

From LACM locality 4438, 'Lake Mission Viejo', Oso Sand Member, Capistrano Formation, marine, Late Miocene to Early Pliocene, Orange County; uncatalogued LACM material.

From LACM locality 3820, 'Aliso Creek at La Paz', Capistrano Formation, marine, Late Miocene to Early Pliocene, Orange County; LACM 128782, dermal bone fragment.

From LACM locality 65131, 'Navy Pipeline', Tulare Formation, marine, Plio-Pleistocene, Kettleman Hills, Kings County; LACM 138554, scute, and numerous uncatalogued specimens.

Remarks: Hilton and Grande (2006:680, fig. 7)) made a few minor errors: specimen LACM 47036 was transposed incorrectly as 40736, and two specimens were given locality numbers (LACM 6688 and 7501) instead of specimen numbers. In addition, Hilton and Grande (2006:680) reported specimen LACM 40166 from the Capistrano Formation and specimen LACM 65131 from the San Joaquin Formation, but the LACM catalogue lists them as Monterey and Tulare formations, respectively. Hilton and Grande (2006:672) considered the Tulare Formation to be Pleistocene, but most others [e.g., McPherson and Miller (1990)] consider it Plio-Pleistocene, thus we include specimens from the Tulare Formation in the catalogue.

Subclass **Neopterygii**
Division **Teleostei**
Order **Elopiformes**

Family **Elopidae**

Genus †*Ectasis* Jordan and Gilbert 1919b
†***Ectasis proriger*** Jordan and Gilbert 1919b

Selected Synonymy & References

†***Ectasis proriger*** Jordan and Gilbert 1919b:62-63, pl. 22.
†***Ectasis proriger*** Jordan and Gilbert: Jordan 1920b:569.
†***Ectasis proriger*** Jordan and Gilbert: Jordan 1921a:242, pl. 17a (restoration).
†***Ectasis proriger*** Jordan and Gilbert: Jordan 1923:118.

Type Specimen: †***Ectasis proriger*** Jordan and Gilbert 1919b, holotype, SU 125, nearly complete right counterpart (pl. 22), whereabouts unknown. **Gonorhynchidae (?).**

Type Locality: 3rd Street Tunnel, Pliocene, Los Angeles, Los Angeles County, California (see Remarks below).

Referred Specimens: Known only by the type specimen.

Referred Specimens in Jordan (1920b:569): No specimens mentioned. **?Elopidae.**

Referred Specimens in Jordan (1921a:242): Only mentions the type specimen. **Elopidae.**

Remarks: Jordan and Gilbert (1919b) described the type from the "Pliocene of the Los Angeles clayey shale at 3rd Street Tunnel" and provided no further locality information. The 3rd Street Tunnel is located in downtown Los Angeles, California, in an area locally referred to as Bunker Hill. Surficial geologic mapping compiled by Dibblee (1989, 1991) of the downtown Los Angeles area placed the locality in the early Pliocene, marine claystone of the Repetto Member of the Fernando Formation.

Jordan and Gilbert (1919b) "provisionally and very doubtfully" placed their new genus †*Ectasis* in the Family Gonorhynchidae. Jordan (1921b) stated that the type "seems closely related to living ***Elops***".

Family **Megalopidae**

Genus *Megalops* Lacepède 1803
?†*Megalops vigilax* (Jordan 1927a)

Figure 1

Selected Synonymy & References

†***Zaphleges vigilax*** Jordan 1927a:6, pl. 1A.
†***Starrias ischyrus*** Jordan 1925:25, pl. 12.
?†***Megalops vigilax*** (Jordan): David 1943:119.

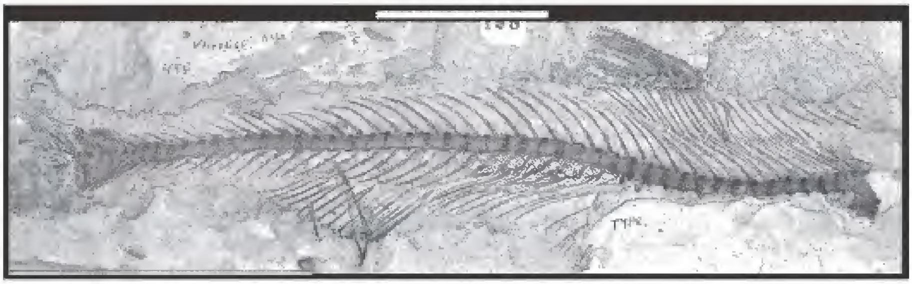


FIGURE 1. ?†*Megalops vigilax* (Jordan 1927a), holotype, CAS 55506 (from color image provided by CAS); scale bar equals 10 cm.

Type Specimen: †***Zaphleges vigilax*** Jordan 1927a, holotype, CAS 55506 (SU 458, 188), partial left counterpart. **Cybiidae**.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County, California.

Referred Specimens: None.

Referred Specimen and Holotype of †***Starrias ischyrus*** Jordan reidentified by David (1943): CAS 55488 (SU 701, 91), partial left counterpart. **Megalopidae**.

Order **Anguilliformes**
Suborder **Muraenoidei**
Family **Muraenidae**
Genus ***Gymnothorax*** Bloch 1795
Gymnothorax mordax (Ayres 1859)

Type Specimen: Extant, ***Muraena mordax*** Ayres 1859, no types known (Eschmeyer 1998:1121).

Type Locality: Cedros Island, Baja California, Mexico.

Referred Specimens in Fitch and Lavenberg (1975:87): No specific specimens or localities are mentioned.

Remarks: Fitch and Lavenberg (1975) mention that teeth of ***G. mordax*** have been found in some Pleistocene and Pliocene deposits in southern California.

Family †**Deprandidae** Jordan 1924
Genus †***Deprandus*** Jordan and Gilbert *in* Jordan 1921
†***Deprandus lestes*** Jordan and Gilbert *in* Jordan 1921

Selected Synonymy & References

†***Deprandus lestes*** Jordan and Gilbert *in* Jordan 1921:252, pls. 9b, 9d, 30b (restoration).

†***Deprandus lestes*** Jordan and Gilbert; Jordan 1924:49-50, pls. L (p. 49), L (p. 50).

Type Specimen: †***Deprandus lestes*** Jordan and Gilbert *in* Jordan 1921, holotype, SU 201A, lower jaw (pl. 9d), whereabouts unknown. Plate 9d is labeled †***Deprandus*** sp., but the specimen has 201A etched on it, therefore we assume it is a figure of the holotype. **Muraenidae**.

Type Locality: Monterey Formation, Late Miocene, El Modena, Orange County, California.

Referred Specimens in Jordan and Gilbert *in* Jordan (1921): From type locality; SU 200A, lower jaw counterpart (unfigured), whereabouts unknown.

From Alhambra, Los Angeles County, formation and age unknown; SU 571, lower jaw counterpart (fig. 9b), whereabouts unknown.

Referred Specimens in Jordan (1924:49-50): This is a very confusing passage. Jordan described and figured two additional specimens, lower jaws, from Alhambra. Both figures are labeled plate L, one on page 49 and the other on page 50. Neither of the specimens have a catalog number. Jordan assigned †***Deprandus*** to a new family †**Deprandidae,** which he thinks "… may prove to be related to the **Muraenisocidae** rather than to the **Muraenidae**".

Order **Albuliformes**
Suborder **Notacanthoidei**
Family **Halosauridae**
Genus †***Laytonia*** David 1943
†***Laytonia californica*** David 1943

Figure 2

Selected Synonymy & References

†*Laytonia californica* David 1943:13-17, pl. 1, fig. 4, pl. 2, fig. 1

Type Specimen: †***Laytonia californica*** David 1943, holotype, LACM (CIT) 10227, nearly complete left and right counterparts (see Remarks). **Halosauridae.**

Type Locality: LACM (CIT) locality 317, "Sepulveda Tunnel", Modelo Formation, Late Miocene, Santa Monica Mountains, Los Angeles County, California.

Referred specimens: Known only by type specimen.

Remarks: In her description, David (1943:13) mislabeled the type specimen as LACM (CIT) 10224, however in the legend of plate 2, fig. 1, it is correctly labeled as LACM (CIT) 10227. She labels the left counterpart on pl. 1, fig. 4 as number 15 of the Layton collection and the right counterpart on pl. 2, fig. 1 as LACM (CIT) 10227. The LACM specimen catalog lists both counterparts as LACM (CIT) 10227. Therefore, the left and right slabs are the same specimen as David (1943) more or less states. The left counterpart (Layton number 15) is in the Type Collection at LACM and the right counterpart is presumed missing.

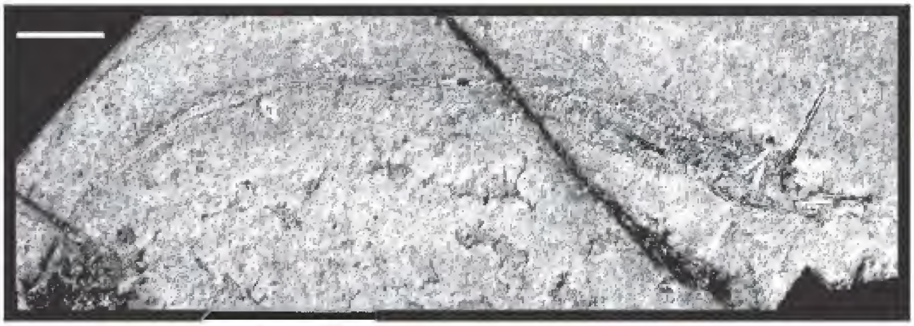


FIGURE 2. †*Laytonia californica* David 1943, holotype, LACM (CIT) 10227 [from color photo provided by G. Takeuchi (LACM)]; scale bar equals 2 cm.

†*Laytonia* cf. *L. californica* David 1943:David 1948

Referred Specimens: in David 1948:94-100, pl. 23, fig. 3; text-fig. 1: From LACM (CIT) locality 391, San Marcos Pass, formation not given, Miocene, Santa Barbara County, California; LACM (CIT) 10399, skull with left and right counterparts (pl. 23, fig. 3; text-fig. 2a, b).

From LACM (CIT) locality 5557, Brea Olinda Oil Field, formation not given, latest Miocene, Orange County, California; LACM (CIT) 10400, scale (left and right counterparts, text-fig. 1).

From several uncatalogued localities in Los Angeles and Ventura counties: numerous uncatalogued scales.

Remarks: David (1948:94) listed specimen LACM (CIT) 10400 under the heading of "Type scale" and its locality as "Type locality" (our quotation marks), however the type specimen and type locality are noted above in the description of †***Laytonia californica***.

†*Laytonia*? *zemorrensis* David 1948

Selected Synonymy & References

†*Laytonia* sp. David: David 1944:32, pl. 3, fig. 23.
†*Laytonia*? *zemorrensis* David 1948:95-97, pl. 23, fig. 2.

Type Specimen: †***Laytonia*? *zemorrensis*** David, holotype, LACM (CIT) 10401, scale, whereabouts unknown.

Type Locality: LACM (CIT) locality 4376, "Texas Company Pioneer Unit Plan 1", formation not given, Early Miocene (Oligocene in LACM database), Kern County, California.

Referred Specimens: Several uncatalogued localities (oil well cores) of Miocene age in Kern and San Luis Obispo counties: numerous uncatalogued scales.

Referred Specimen in David (1944): Texas Company Pioneer Unit Plan well number 1, Sunset district, San Joaquin Valley, formation not given, Early Miocene, Kern County; scale, whereabouts unknown.

Distribution of Neogene ***†L.? zemorrensis*** outside of California: None known, but it has been reported from the Bastendorff Formation, Eocene-Oligocene near Coos Bay, Oregon.

Remarks: The specimen described in David (1944) is probably the holotype, but since the whereabouts of the holotype is unknown, we were unable to check its morphology.

Order **Clupeiformes**

Family **Engraulidae**

Genus ***Engraulis*** Cuvier 1816
Engraulis mordax Girard 1854a

Selected Synonymy & References (fossils only)

Engraulis mordax Girard: Fitch 1967:9.
Engraulis mordax Girard 1854a: Fitch and Reimer 1967:79, 81, 84, table 1, fig. 4.
Engraulis mordax Girard: Fitch 1968:7.
Engraulis mordax Girard: Fitch 1969a:72, table 1.
Engraulis mordax Girard: Fitch and Lavenberg 1971:69.
Engraulis mordax Girard: Nolf 1985:45.
Engraulis mordax Girard: Grande and Nelson 1985:6

Type Specimen: Extant, ***Engraulis mordax*** Girard, no types known (Eschmeyer 1998:1120).

Type Locality: San Francisco, California.

Referred Specimens in Fitch (1967:9): No specific specimens or locality. He notes that otoliths of ***E. mordax*** have been found in many Pliocene and Pleistocene deposits in southern California (see Remarks).

Referred Specimens in Fitch and Reimer (1967:79, 81, 84, table 1, fig. 4): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one otolith (fig. 4) (See Remarks).

Referred Specimens in Fitch (1968:7): No specific specimens or locality. He notes that otoliths have been found in many southern California Pliocene and Pleistocene deposits (see Remarks).

Referred Specimens in Fitch (1969a:table 1): No specific specimens, but he listed the number of otoliths of ***E. mordax*** that were found in the following Pliocene localities:

From LACMIP 471 (= LACM locality 3802), Upper Newport Bay, Upper Fernando Formation, Plio-Pleistocene, Orange County; six otoliths.

From LACMIP 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 23 otoliths. (See Remarks).

Referred Specimens in Fitch and Lavenberg (1971:69): No specific specimens or locality. The authors state that otoliths of ***E. mordax*** have been found in Pliocene exposures between Mexico and Eureka, California (see Remarks).

Referred Specimens in Nolf (1985:45): No specific specimens and refers to the otoliths reported above by Fitch (1967).

Referred Specimens in Grande and Nelson (1985:6): No specific specimens and refers to the otoliths reported above by Fitch (1967).

Distribution of Neogene ***E. mordax*** outside of California: None known, except the reference above to Mexico.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 31245) is in Pleistocene strata, therefore a Pliocene record of ***E. mordax*** from this locality is questionable. Fitch (1969a) also listed otoliths of ***E. mordax*** from LACMIP locality 435 (Lomita Marl), a locality now considered of Pleistocene age (Blake 1991; Dibblee 1999).

Family **Clupeidae**

Genus †*Alisea* Jordan and Gilbert 1919a

†*Alisea grandis* Jordan and Gilbert 1919a

Figure 3

Selected Synonymy & References

†*Alisea grandis* Jordan and Gilbert 1919a:28, pl. 17, fig. 3.
†*Alisea grandis* Jordan and Gilbert: Jordan 1921a:245, pl. 27b (restoration).
†*Alisea grandis* Jordan and Gilbert: Grande 1985:303-309.

Type Specimen: †*Alisea grandis* Jordan and Gilbert, holotype, CAS 55468 (SU 135, 119), partial right and left counterparts. **Clupeidae.**

Type Locality: San Pedro, formation not given, Miocene, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1921a): None.

Remarks: Grande (1985:309) stated "It is doubtful whether this poorly preserved specimen warranted description as a new taxon."

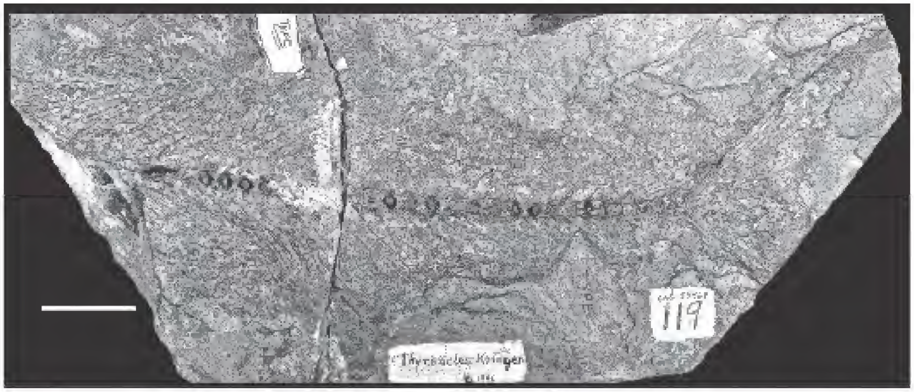


FIGURE 3. †*Alisea grandis* Jordan and Gilbert 1919a, holotype, CAS 55468 (from color image provided by CAS); scale bar equals 5 cm.

Genus *Clupea* Linnaeus 1758

Clupea pallasii Valenciennes *in* Cuvier and Valenciennes 1847

Selected Synonymy & References (fossils only)

Clupea pallasii Valenciennes *in* Cuvier and Valenciennes 1847: Fitch 1967:9, 19-21.
Clupea pallasii Valenciennes *in* Cuvier and Valenciennes: Fitch 1968:7.
Clupea pallasii Valenciennes *in* Cuvier and Valenciennes: Fitch 1969a: 72, table 1.
Clupea pallasii Valenciennes *in* Cuvier and Valenciennes: Fitch and Lavenberg 1975:43.
Clupea pallasi Valenciennes *in* Cuvier and Valenciennes: Nolf 1985:47.

Type Specimen: Extant, *Clupea pallasii* Valenciennes *in* Cuvier and Valenciennes, no types known (Eschmeyer 1998:1271).

Type Locality: Kamchatka, Russia.

Referred Specimens in Fitch (1968:7): No specific specimens or locality. He gave the general statement that otoliths have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1969a:table 1): No specific specimens, but he listed the number of otoliths of *C. pallasii* that were found in the following Pliocene localities:

From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay, Upper Fernando Formation, Plio-Pleistocene, Orange County; 1 otolith.

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 3 otoliths. (See Remarks).

Referred Specimens in Fitch and Lavenberg (1975:43): They make the general statement that otoliths of *C. pallasii* have been found in Pliocene deposits of California.

Remarks: Fitch (1967, 1969a) reported otoliths of *C. pallasii* from LACMIP locality 435 (Lomita Marl), however this locality is now considered Pleistocene age (Blake 1991; Dibblee 1999). Nolf (1985) cited Fitch (1967) that otoliths of *C. pallasii* were present in Pliocene strata of California. If he had cited Fitch (1969a), then his statement would have been correct.

†*Clupea tiejei* David 1943

Figure 4

Selected Synonymy & References

†*Clupea tiejei* David 1943:92-93, pl. 12.
†*Clupea tiejei* David: Grande 1985:313.

Type Specimen: †***Clupea tiejei*** David 1943, holotype, LACM (CIT) 10344 (= USC TM 200), right counterpart. **Clupeidae.**

Type Locality: LACM locality 4967, Elysian Park, Modelo Formation, Late Miocene, Los Angeles County.

Remarks: Only specimen known. Grande (1985) questioned whether the species belongs to the genus ***Clupea***.

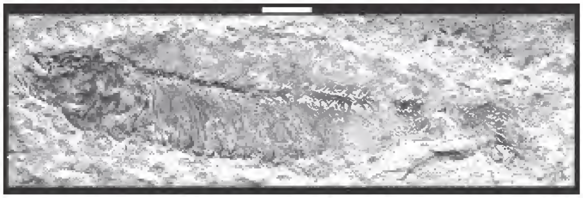


FIGURE 4. †*Clupea tiejei* David 1943, holotype, LACM (CIT) 10344 (= USC TM 200) (from color image provided by LACM); scale bar equals 1 cm.

Genus †*Etringus* Jordan 1907

†*Etringus scintillans* Jordan 1907

Figure 5

Selected Synonymy & References

†*Etringus scintillans* Jordan 1907:121-125, figs. 17.
†*Etringus scintillans* Jordan: Jordan 1919:5-6, pl. 1, fig. 1.
†*Etringus scintillans* Jordan: Jordan 1921a:241.
†*Etringus scintillans* Jordan: David 1943:6-9, pl. 1, figs. 2, 3, table (unnumbered).
†*Etringus scintillans* Jordan: David 1943:55.
†*Etringus scintillans* Jordan: David 1943:95.
†*Etringus scintillans* Jordan: David 1944:36, text-fig. 4, figs. 1-8, pl. 4, fig. 32.
†*Etringus scintillans* Jordan: Pierce 1956:1309, pl. 144, fig. 4.
†*Etringus scintillans* Jordan: Grande 1985:316.

Type Specimen: †***Etringus scintillans*** Jordan 1907, holotype, CAS 55492 (SU 53), left counterpart (see Remarks).

Type Locality in Jordan (1907): Soledad Pass, (see Remarks).

Referred Specimens: SU 29, whereabouts unknown (see Remarks). **†Leptolepidae ?** (or more correctly **†Leptolepididae**).

Type Locality in Jordan (1919): Brown's Cañon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County (see Remarks).

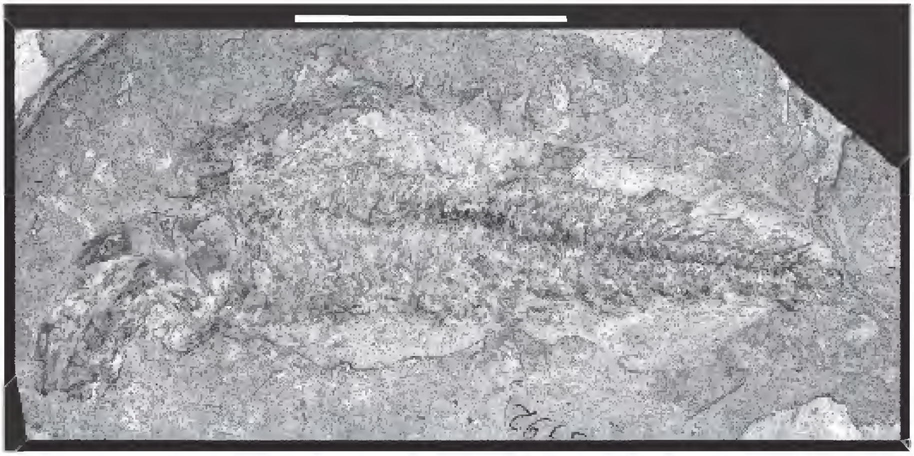


FIGURE 5. †*Etringus scintillans* Jordan 1907, holotype, CAS 55492 (from color image provided by CAS); scale bar equals 5 cm.

Paratypes given in Jordan (1919): From type locality: CAS 55493 (SU 65 and 66, right and left counterparts, poorly preserved), 55490 (SU 99); 55513 (five specimens, three with SU numbers 101, 102, and 104); SU 75, 76, 77, 89, 95, 96, 99, whereabouts unknown.

From: Soledad: SU 84, whereabouts unknown.

Referred Specimens in Jordan (1919): From Brown's Cañon (near North Beverly Glen Blvd), Modelo Formation, Late Miocene, Los Angeles County; SU 97, 98, 100, 103, whereabouts unknown. **†Pholidophoridae.**

Referred Specimens in Jordan (1921a): No specific specimens mentioned. **†Ganolytidae.**

Referrred Specimens in David (1943:6-9): From LACM (CIT) localities 317, 320, and 321, Sepulveda Canyon, Modelo Formation, Late Miocene, Los Angeles County; specimens LACM (CIT) 10002, counterpart; 10003, right and left counterparts; 10004-10007, counterparts; 10010, counterpart; 10041; left and right counterparts; 10042; right counterpart; 10056, partial left counterpart; 10057, left counterpart; 10059, right counterpart; 10103, left and right counterparts; Layton collection specimens 5-9, 22, 24-27, whereabouts unknown; UCLA specimen 1.555, whereabouts unknown; LACM specimen 1062, left and right counterparts. Placed †*E. scintillans* in the family **Dussumieridae** [now considered a subfamily of the **Clupeidae** (Nelson 2006:132)].

Referred Specimens in David (1943:55): Notes there are a number of more or less well-preserved specimens, but only specifically mentions no. 202 in the Los Angeles City College collection, whereabouts unknown, and an uncatalogued fragment from LACM (CIT) locality 382, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Referred Specimens in David (1943:95): No specific specimens mentioned. Recognizes ***†E. scintillans*** as a clupeoid.

Referred Specimens in David (1944:36, text-fig. 4, figs. 1-8, pl. 4, fig. 32): From LACM (CIT) locality 334, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene, Los Angeles County; scale (text-fig. 4, fig. 1, pl. 4, fig. 32), whereabouts unknown.

From Axis Company Rowland well number 1 locality, Middle-Late Miocene: two scales (text-fig. 4, figs. 2, 3), whereabouts unknown.

From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene, Los Angeles county: three scales (text-fig. 4, figs. 4-6), whereabouts unknown.

From Puente Hills, Puente Formation, Middle-Late Miocene, Los Angles County; two scales (text-fig. 4, figs. 7, 8), whereabouts unknown.

From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; scale (unfigured), whereabouts unknown. **Dussumieridae.**

Referred Specimens in Pierce (1956:1309, pl. 144, fig. 4): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3637, scale, whereabouts unknown.

Referred Specimens in Grande (1985): No specific specimens mentioned. †***Etringus*** is misspelled as †***Estringus***. **Clupeidae**.

Remarks: The type locality is given as Soledad Pass in Jordan (1907:124) and Brown's Cañon in Jordan (1919:5).

The identifications of the referred specimens in Jordan (1907) are very confusing. Specimen SU 29 is in two parts, but each part is labeled differently in the figure legends. Figure 18 is identified as †***E. scintillans*** and Figure 19 as †***E. scintillans*?** Scales that surround the specimen in Fig. 19 are identified as †***E.* sp**. Finally, he identified an unnumbered and unfigured specimen from Brea Cañon, Orange County as †***E.* sp**. Jordan (1907:125) concluded that all of these fragments probably belong †***E. scintillans***.

The legend of pl. 1, fig. 1 in Jordan (1919) states that the specimen number is SU 52 and the holotype of †***E. scintillans***. The type specimen figured in Jordan (1919) is the exact same specimen figured in Jordan (1907) as the holotype, but is identified as SU 53 (CAS 55492).

†***Etringus*** **sp.**: David 1944:30-33, text-figs. 1-3, pls. 2, 4)

Referred Specimens: From Ohio Oil Company "K.C.L.-G." well number 1, Fruitvale District, formation not given, Early-Middle Miocene (Zemorrian), Kern County; two scales (text-fig. 2, fig. 8, pl. 2, fig.11) and opercular bones (unfigured), whereabouts unknown.

From Texas Company Pioneer Unit Plan well number 1, Sunset District, San Joaquin Valley, formation not given, Early-Middle Miocene (Zemorrian), Kern County; seven scales (text-fig. 2, figs. 2-7, pl. 2, fig. 11a), operculum and ventral scute (text-fig. 1b, c), whereabouts unknown.

From Superior Krause well number 1, Fruitvale District, San Joaquin Valley, formation not given, Early-Middle Miocene (Saucesian), Kern County; scale, whereabouts unknown.

From Palos Verdes, Altamira shale Member, Monterey Formation, Middle-Late Miocene, Los Angeles County; two scales (text-fig. 3, figs. 4, 5; pl; 4, fig. 31), whereabouts unknown.

From Findley Frazier "Portals" well number 1, Edison District, San Joaquin Valley, formation not given, Early Miocene, Kern County; four scales (text-fig. 3, figs. 1-3, 6), whereabouts unknown.

From Associated Williamson well number 1, Williamson area, San Joaquin Valley, formation not given, Early Miocene (Saucesian), Kern County; opercular bones (unfigured), whereabouts unknown.

From Etienne Land "Occidental" well number 2, Lost Hills area, San Joaquin Valley, formation not given, Early Miocene (Saucesian), Kern County; opercular bones (unfigured), whereabouts unknown.

From Harold C. Morton well number 1, Lost Hills area, San Joaquin Valley, formation not given, Early Miocene (Saucesian), Kern County; opercular bones (unfigured), whereabouts unknown.

From Western Gulf Oil Company Lechler well number 1, Oakridge, formation not given, Middle-Late Miocene (Mohnian). Kern County; numerous scales (unfigured), whereabouts unknown.

Genus †***Ganoessus*** Jordan 1920b

Selected Synonymy & References

†***Ganolytes*** Jordan and Gilbert 1919a [in part].
†***Ganoessus*** Jordan 1920b:571.
†***Lembicus*** Jordan 1925:42-43, pl. 11b: David 1943:94-95.
†***Epelichthys*** Jordan 1925:48: David 1943:94-94.
†***Ganoessus*** Jordan: David 1943:94-95.
†***Ganoessus*** Jordan: Grande 1985:317.

†*Ganoessus clepsydra* (Jordan and Gilbert 1919a)

Figure 6

Selected Synonymy & References

†***Ganolytes clepsydra*** Jordan and Gilbert 1919a:23, pl. 11, fig. 1.
†***Ganoessus clepsydra*** (Jordan and Gilbert): Jordan 1920b:571.
†***Ganoessus clepsydra*** (Jordan and Gilbert): Jordan 1921a:241.
†***Ganoessus clepsydra*** (Jordan and Gilbert): Jordan 1925:8.
†***Ganoessus clepsydra*** (Jordan and Gilbert): David 1943:94-95.
†***Ganoessus clepsydra*** (Jordan and Gilbert): Grande 1985:317.

Type Specimen: †***Ganolytes clepsydra*** Jordan and Gilbert 1919a, holotype, CAS 55413 (SU 6, 162), partial left counterpart.

Type Locality: El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimens in Jordan and Gilbert (1919a): None. †**Pholidophoridae.**

Referred Specimens in Jordan (1920b): None, but establishes the new genus †***Ganoessus*** with †***Ganolytes clepsydra*** as the type species.

Referred Specimens in Jordan (1921a): None. †**Ganolytidae.**

Referred Specimens of †*G. clepsydra* in Jordan (1925): No specific specimens mentioned, but those examined came from: Featherstone Quarry, Covina, Puente Formation, Late Miocene, Los Angeles County.

Referred Specimens of †*G. clepsydra* in (David 1943): None and notes that all specimens other than the holotype are lost. Concludes that †***Lembicus*** and probably †***Epelichthys*** are cogeneric with †***Ganoessus*.** **Clupeidae.**

Referred Specimens of †*G. clepsydra* in Grande (1985):none. **Clupeidae.**

Remarks: David (1943:94) noted that all specimens, except for the holotype, of †***Ganoessus clepsydra*** are lost. It is not clear what specimens she considered lost because the holotype is the only specimen known.

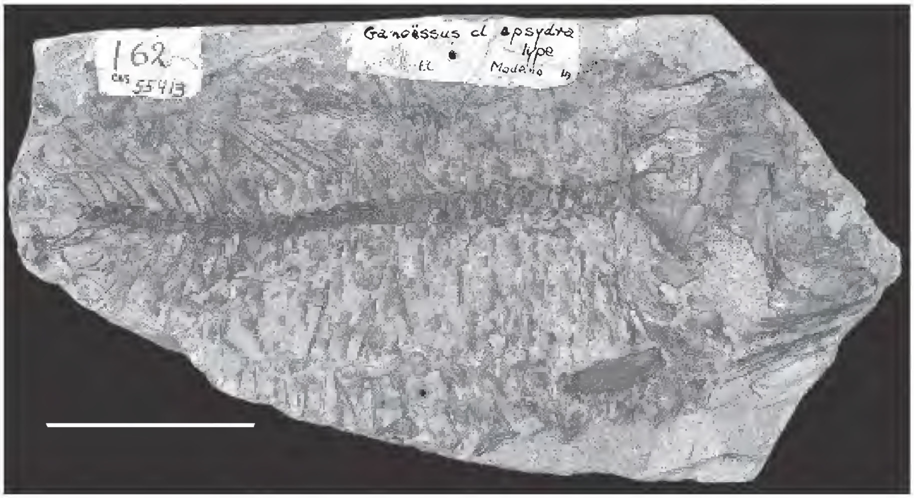


FIGURE 6. †*Ganoessus clepsydra* (Jordan and Gilbert 1919a), holotype, CAS 55413 (from color image provided by CAS); scale bar equals 5 cm.

†*Ganoessus meiklejohni* (Jordan 1925)

Figure 7

Selected Synonymy & References

†***Lembicus meiklejohni*** Jordan 1925:42-43, pl. 11b.
†***Ganoessus meiklejohni*** (Jordan): David 1943:94-95.
†***Lembicus meiklejohni*** Jordan: Grande 1985:319.

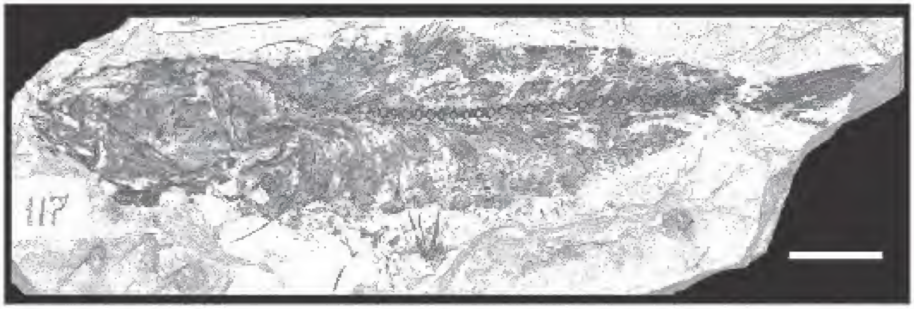


FIGURE 7. †*Ganoessus meiklejohni* (Jordan 1925), holotype, CAS 55476 (from color image provided by CAS); scale bar equals 5 cm.

Type Specimen: †***Lembicus meiklejohni*** Jordan 1925, holotype, CAS 55476 (SU 691, 117), right counterpart.
Type Locality: Featherstone Quarry, Covina, Puente Formation, Late Miocene, Los Angeles County.
Referred Specimens: None. **Clupeidae.**
Remarks: David (1943) concluded with little comment that †***Lembicus*** is cogeneric with †***Ganoessus***. Grande (1985) offered no opinion on this issue, thus we follow David as the last reviser and recognize †***Ganoessus meiklejohni*** as the valid specific name.

†*Ganoessus michaelis* (Jordan 1925)

Figure 8

Selected Synonymy & References

†***Epelichthys michaëlis*** Jordan 1925:48-49, pl. 20c.
†***Ganoessus michaëlis*** (Jordan): David 1943:94-95.
†***Epelichthys michaelis*** Jordan: Grande 1985:317.

Type Specimen: †***Epelichthys michaëlis*** Jordan 1925, holotype, CAS 55510 (SU 777), poorly preserved caudal half of right counterpart. **Clupeidae.**
Type Locality: California Kieselguhr Company Diatomite Quarry, Buttle Member, Monterey Formation,

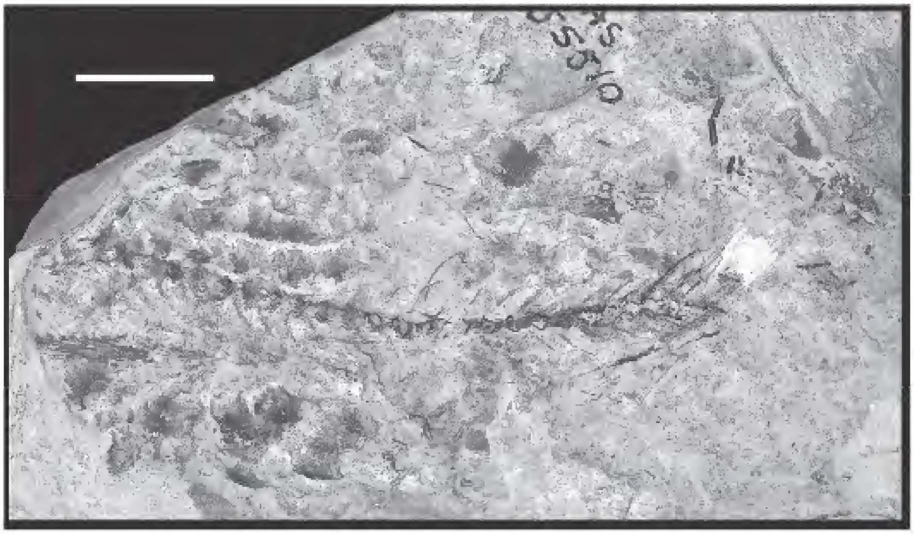


FIGURE 8. †*Ganoessus michaelis* (Jordan 1925), holotype, CAS 55510 (from image provided by CAS); scale bar equals 2 cm.

Middle or Late Miocene (Mandra 1963, Hart, 1966; Durham 1974), near San Miguel (actually closer to the town of Bradley), Monterey County.

Referred Specimen: From the type locality: SU 775, whereabouts unknown.

Remarks: David (1943) suggested that †*E. michaelis* is cogeneric with †*Ganoessus* Jordan 1920b. Grande (1985) offered no opinion on this issue, thus we follow David as the last reviser and recognize †***Ganoessus michaelis*** as the valid species name. According to David (1943:95) the holotype is lost, but it is in the CAS collection.

Genus †*Ganolytes* Jordan 1919

†*Ganolytes aratus* (Jordan 1924)

Figure 9

Selected Synonymy & References

†***Diradias aratus*** Jordan 1924:42, pl. F.
†***Diradias aratus*** Jordan: Jordan 1925:8.
†***Diradias aratus*** Jordan: Jordan 1927a:5.
†***Thyrsion velox*** Jordan and Gilbert 1920:17 [in part]: David 1943:120.
†***Diradias fenestralis*** Jordan 1925:9, pl. 1: David 1943:120.
†***Xenothrissa aphrasta*** Jordan 1925:10, pl. 2: David 1943:120.
†***Beltion peronides*** Jordan 1925:16, pl. 7 [in part]: David 1943:120.
†***Ganolytes aratus*** ? (Jordan 1924): David 1943:120-122; text-fig. 21.
†***Ganolytes*** **cf. *aratus*** (Jordan): David 1944:38; text-fig. 6, fig. 4.
†***Ganolytes aratus*** (Jordan): Pierce 1956:1308-1309, pl. 144, fig. 2.

Type Specimen: †***Diradias aratus*** Jordan 1924, holotype, CAS 55544 (SU 1, 600 and 600A) counterparts. **Clupeidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimen: SU 601, whereabouts unknown.

Referred Specimen of †*D. aratus* in Jordan (1925): From type locality: SU 691 (see Remarks).

Referred Specimens of †*D. aratus* in Jordan (1927a): From type locality: two specimens with whereabouts unknown, SU 475 and 481.

Referred Specimens of †*D. aratus* in David)1943): From type locality: CAS 55539 (SU 5, 691), right counterpart; 11 specimens with whereabouts unknown: SU 3 (175), 4 (690), 6 (694), 8 (753), 9 (754), 12 (88), 13 (784), 110 (781), 111 (771), 112 (401), 114 (769), 115 (772), 11 (754), and 187. Also, numerous uncatalogued fragments in SU collection, one uncatalogued specimen in the collection of the Zoology Department, University of California at Berkeley, another uncatalogued specimen in the office of the Kelco company, and several uncatalogued specimens in the office of the Johns-Manville Company in Lompoc.

Referred Specimen of †*Thyrsion velox* in David (1943): From type locality: CAS 55416 [SU 2 (127, 306)], nearly complete left counterpart.

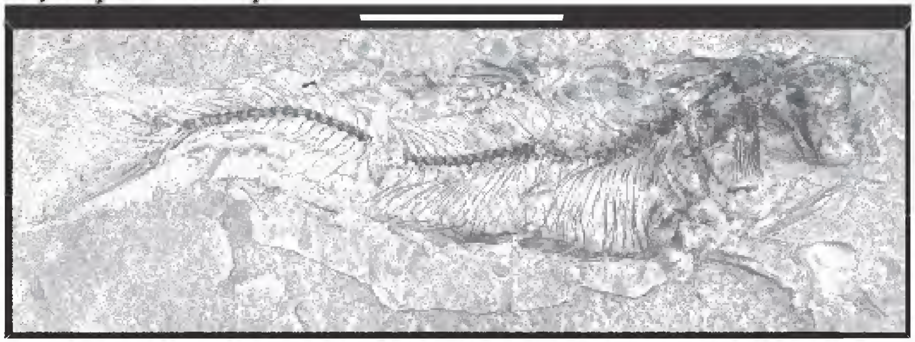


FIGURE 9. †*Ganolytes aratus* (Jordan 1924), holotype, CAS 55544 (from color image provided by CAS); scale bar equals 10 cm.

Referred Specimen of †***Diradias fenestralis*** in David (1943:120): From type locality: CAS 55527 (SU 759), holotype, well-preserved left counterpart.

Referred Specimen of †***Xenothrissa aphrasta*** in David (1943): From type locality: CAS 55424 (SU 14, 607), holotype, poorly preserved left counterpart.

Referred Specimens of †***Beltion peronides*** in (David 1943): From type locality: CAS 55522 (SU 113, 612), right counterpart, and CAS 55599 (SU 187, 641), left counterpart.

Referred Specimens of †***G.* cf. *aratus*?** In David (1944:38, text-fig. 6, fig. 4):

LACM (CIT) locality 334, Santa Monica Mountains, Modelo Formation, Late Miocene (Mohnian), Los Angeles County; scale, whereabouts unknown.

Referred Specimens of ***G. aratus*** in Pierce (1956:1308-1309, pl. 144, fig. 2: From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3635, scale, whereabouts unknown.

Remarks: Jordan (1925) listed the holotype of ***Lembicus meiklejohni*** [CAS 55476 (SU 691, 117)] as a referred specimen of ***D. aratus*** (compare statements on pages 9 and 42). This is confusing. Based on the conclusions of David (1943:5, 94), Grande (1985:315) believed †***D. aratus*** to be a junior synonym of †***G. cameo***. This is a true interpretation for what was stated on pages 5 and 94, but in pages 120-122, David includes †***D. aratus*** in the genus †***Ganolytes***, and recognizes †***G. aratus*** as a separate species from †***G. cameo***. Grande (1985:323) also agreed with David (1943), that †***Xenothrissa aphrasta*** Jordan (1925) is a subjective synonym of †***G. aratus***.

†***Ganolytes cameo*** Jordan 1919

Figure 10

Selected Synonymy & References

†***Ganolytes cameo*** Jordan 1919:6-7, pl. 2, fig. 3, pl. 4, figs. 1, 2 .
†***Etringus scintillans*** Jordan 1907:123, figs. 18, 19 [in part]: Jordan 1919:6.
†***Ganolytes cameo*** Jordan: Jordan 1921a:241, pl. 15 (restoration).
†***Ganolytes cameo*** Jordan: David 1940:2184.
†***Ganolytes cameo*** Jordan: David 1943:3-6, 55, 94, 122, text-fig. 2, pl. 1, fig. 1.
†***Ganolytes cameo*** Jordan: David 1944:37-38, text-fig. 6, figs. 1, 2, 5, pl. 3, fig. 32.
†***Ganolytes cameo*** Jordan: Grande 1985:317
†***Ganolytes cameo*** Jordan: Huddleston and Takeuchi 2006:33, table 1.

Type Specimen: †***Ganolytes cameo*** Jordan 1919, holotype, CAS 55419 (SU 60, 92), two counterpart fragments labeled no. 29 as †***Etringus scintillans*** and figured as figs. 18 and 19 in Jordan (1907:123). See Remarks section of †***E. scintillans***. †**Pholidophoridae**.

Type Locality: Brown's Cañon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Paratypes: From type locality: CAS 55467 (SU 70) and 55463 (SU 92); seven specimens with whereabouts unknown, SU 61, 64, 71, 73, 74, 91, and 93.

From Soledad Pass: two specimens with whereabouts unknown, SU 62 and 84.

Referred Specimens: From Walnut, Puente Valley, formation and age not given: CAS 55614 (SU 67), right and left counterparts (designated as a paratype in CAS collection).

Referred Specimens of †***Ganolytes cameo*** in Jordan (1921a): No specific specimens mentioned, but he established the Family †**Ganolytidae** with †***Ganolytes*** as the type genus.

Referred Specimens of †***G. cameo*** in David (1940): From LACM (CIT) locality 363, Padran Oil Corporation, McEwen well Number 1, Modelo Formation, Late Miocene, Torrance, Los Angeles County; LACM (CIT) 10149, scale, whereabouts unknown. **Clupeidae**.

Referred Specimens of †***G. cameo*** in David (1943:3-6): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; CAS 55665 (SU 68) of the Layton collection (designated as a paratype in the CAS catalog), left counterpart; LACM (CIT) 10001, right and left counterparts; LACM (CIT) 10028, left counterpart.

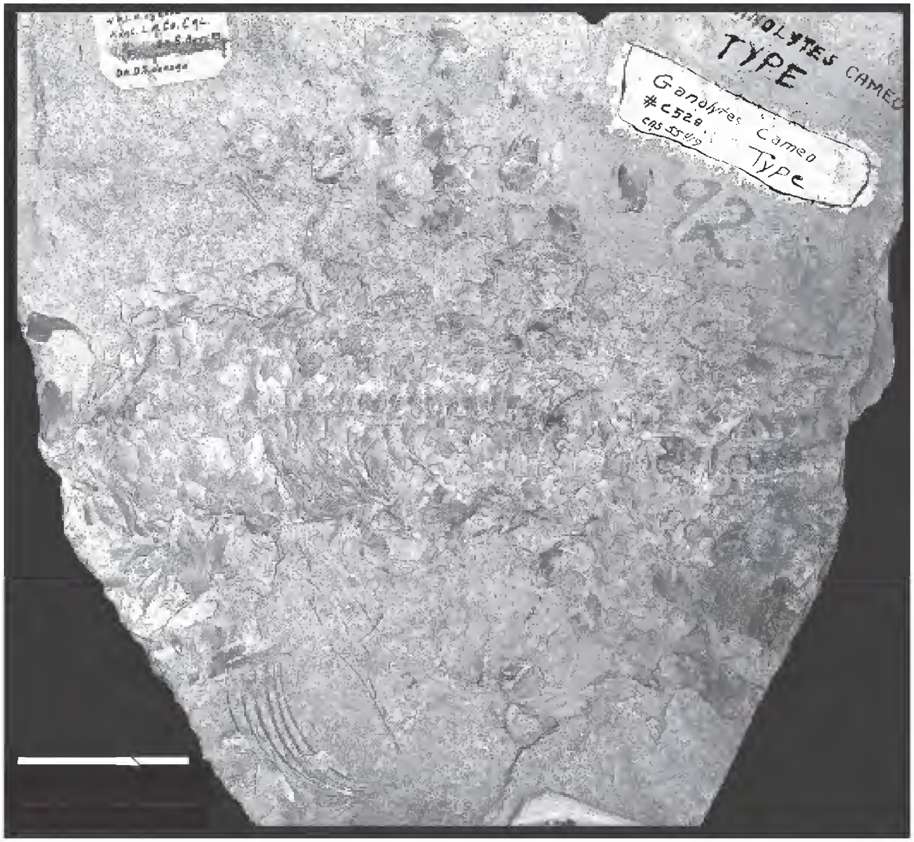


FIGURE 10. †*Ganolytes cameo* Jordan 1919, holotype, CAS 55419 (from color image provided by CAS); scale bar equals 5 cm.

From LACM (CIT) locality 334, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10237, right counterpart.

Referred Specimens of †*G. cameo* in David (1943:55): From LACM (CIT) locality 380, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; numerous uncatalogued specimens (scales and head fragment), whereabouts unknown.

Referred Specimens of †*G. cameo* in David (1943:122): No specific specimens mentioned.

Referred Specimens of †*G. cameo* in David (1944:37-38, text-fig. 6, figs. 1, 2, 5, pl. 3, fig. 32): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; four scales (text-fig. 6, fig. 1), whereabouts unknown.

From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene, Los Angeles County; scale (text-fig. 6, fig. 2), whereabouts unknown.

From Topanga Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; two scales (text-fig. 6, fig. 5, pl. 3, fig. 32), whereabouts unknown.

Referred Specimens of †*G. cameo* in Grande (1985): No specific specimens mentioned. **Clupeidae.**

Referred Specimens of †*G. cameo* in Huddleston and Takeuchi (2006:table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens.

Remarks: CAS 55666 is labeled as a paratype in the CAS collection. It supposedly is pl. 2, fig. 3 in Jordan 1919.

†*Ganolytes* cf. *G. cameo*: Pierce 1956:1309, pl. 144, fig. 3

Referred Specimen in Pierce (1956): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3636, scale, whereabouts unknown. **Clupeidae.**

†*Ganolytes* sp.

Selected References

†*Ganolytes* **sp.**: David 1944:38, text-fig. 6, fig. 3.
†*Ganolytes* **sp.**: Huddleston and Takeuchi 2006:33, table 1.

Referred Specimen in David (1944): From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene (Mohnian), Los Angeles County; scale (text-fig. 6, fig. 3), whereabouts unknown.

Referred Specimens in Huddleston and Takeuchi (2006:table 1): LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens.

Genus *Opisthonema* Gill 1861[a]

†*Opisthonema palosverdensis* David 1943

Figure 11

Selected Synonymy & References

†*Opisthonema palosverdensis* David 1943:84-85, text-fig, 15.
†*Opisthonema palosverdensis* David 1943:95.
†*Opisthonema palosverdensis* David: Grande 1985:320.

Type Specimen: †*Opisthonema palosverdensis* David 1943, holotype, LACM (CIT) 10101, right counterpart. **Clupeidae.**

Type Locality: LACM (CIT) 341, Altimira Shale Member, Monterey Formation, Middle-Late Miocene, Palos Verdes, White's Point, Los Angeles County.

Referred Specimens in David (1943:84-85, 95): None.

Referred Specimens in Grande (1985): Mentioned that the holotype is the only known specimen of †*O. palosverdensis*.

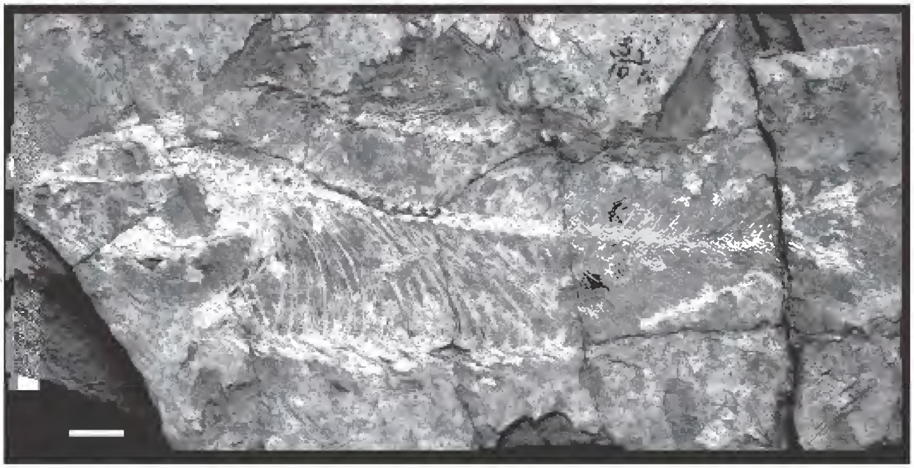


FIGURE 11. †*Opisthonema palosverdensis* David 1943, holotype, LACM (CIT) 10101 (from color image provided by LACM); scale bar equals 1 cm.

Genus †*Quisque* Jordan 1920b
†*Quisque gilberti* Jordan 1920b
Figure 12

Selected Synonymy & References
†***Quisque gilberti*** Jordan 1920b:571.
†***Quisque gilberti*** Jordan: Jordan 1921a:245, pls. 8b, 20b (restoration).
†***Quisque gilberti*** Jordan: David 1943:95.
†***Quisque gilberti*** Jordan: Grande 1985:321.

Type Specimen: †***Quisque gilberti*** Jordan 1920b, holotype, CAS 70043 (SU 18), several small specimens. **Clupeidae.**

Type Locality: Hewes (= Hew's) Park, El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimen: SU 17, whereabouts unknown.

Referred Specimens in David (1943): No mention of a specific specimen. She considered †***Q. gilberti*** a clupeid.

Referred Specimens in Grande (1985): No mention of specific specimens. **Clupeidae.**

Remarks: The genus was proposed in Jordan (1920b) (Genera of Fishes) with †***Q. gilberti*** as the type species with a very brief description. A full description with museum numbers and referred specimen was first given in Jordan (1921a). The specimen figured in Jordan (1921a, pl., 8b) is listed as the holotype in the figure legend, but it does not seem to be on this slab.

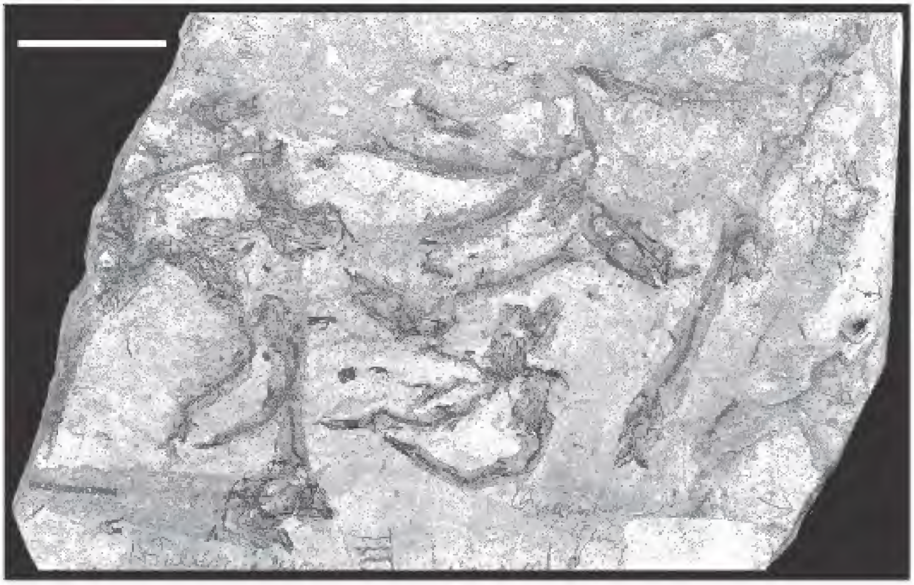


FIGURE 12. †*Quisque gilberti* Jordan 1920b, holotype, CAS 70043 (from color image provided by CAS); scale bar equals 3 cm.

Genus †*Xyne* Jordan and Gilbert 1919a
†*Xyne grex* Jordan and Gilbert 1919a
Figure 13

Selected Synonymy & References
†***Xyne grex*** Jordan and Gilbert 1919a:25, pl. 9, fig. 1, pl. 10, figs. 1, 2, pl. 11, figs. 2, 3.
†***Xyne grex*** Jordan and Gilbert: Jordan and Gilbert 1920:9-10, pl. 1-3.
†***Xyne fitgeri*** Jordan and Gilbert 1920:10, pls. 4, 5.
†***Xyne grex*** Jordan and Gilbert: Jordan 1920c:18-22, unnumbered figure.

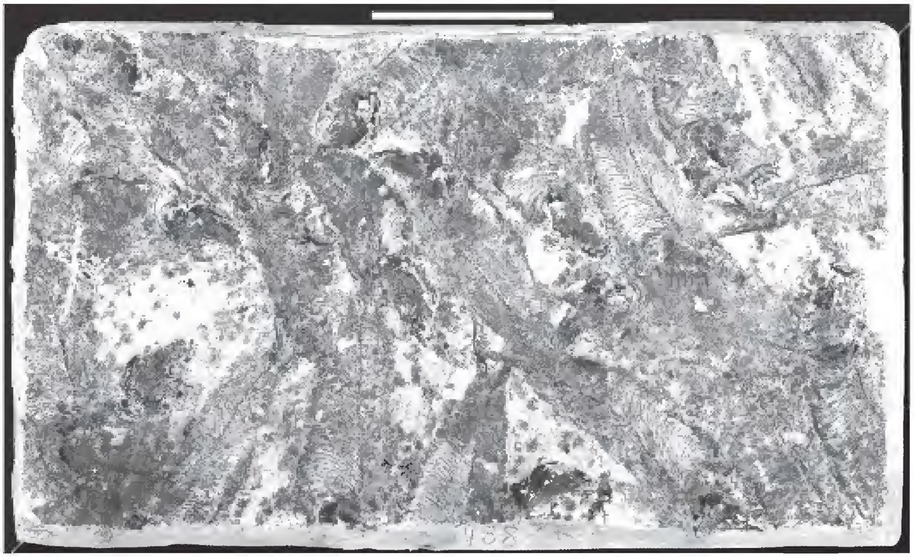


FIGURE 13. †*Xyne grex* Jordan and Gilbert 1919a, holotype, CAS 55420 (from color image provided by CAS); scale bar equals 10 cm.

†***Xyne grex*** Jordan and Gilbert: Jordan 1921a:242, pl. 19 (restoration).
†***Xyne fitgeri*** Jordan and Gilbert: Jordan 1921a:243.
†***Xyne grex*** Jordan and Gilbert: Jordan 1922b:708-709.
†***Xyne grex*** Jordan and Gilbert: David 1943:54; 89, text-fig. 16; 93, table.
†***Xyne grex*** Jordan and Gilbert: David 1944:38, text-fig. 5, figs. 1-3, pl. 3, figs. 29a, b.
†***Xyne grex*** Jordan and Gilbert: Pierce 1956:1308; pl.144, fig. 1.
†***Xyne grex*** Jordan and Gilbert: Grande 1985:251, 323, tables 10a, 10b.
†***Xyne grex*** Jordan and Gilbert: Brace-Thompson 1994:68-72, unnumbered figure.
†***Xyne grex*** Jordan and Gilbert: Frickhinger 1995:570, unnumbered figure.
†***Xyne grex*** Jordan and Gilbert: Huddleston and Takeuchi 2006:33, table 1.

Type Specimen: †***Xyne grex*** Jordan and Gilbert 1919a, holotype, CAS 55420 (SU 108), slab containing 24 skeletons. **Clupeidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: From type locality: all in the CAS collection: SU 34, slab with 7 skeletons (pl. 10, fig. 2); SU 28, slab with 5 skeletons; SU 15 slab with 4 skeletons (pl. 11, figs. 2 and 3); an uncatalogued slab with 16 skeletons.

Referred Specimens of †*X. grex* in Jordan and Gilbert (1920): From type locality: CAS 55429 (SU 39); CAS 55585 (116, 131, left counterpart and figured in pl. 1); CAS 55422 (203, ?139); CAS 55521 (288, 139); 10 specimens whereabouts unknown: SU 24, 27, 36, 51, 110, 123, 126, 153, 157B, and 243. The legend for plate 2 gives the specimen number as SU 12, but no specimen with this number is mentioned in the text.

Referred Specimens and Holotype of †*X. fitgeri* Jordan and Gilbert (1920:10, pls. 4, 5): From type locality: Holotype, CAS 55405 (SU 167A and 167B, 130, pl. 4). From type locality: referred specimens, CAS 55670 (SU 26, 143, pl. 5 (listed as a paratype in the CAS catalogue); CAS 55672 (SU 205) (listed as a paratype in the CAS catalog); 17 specimens whereabouts unknown: SU 29, 44, 124, 140, 146, 149, 150, 196, 235, 241, 244, 274, 278, 291, 314, 324, and 411. **Clupeidae.**

Referred Specimens of †*X. grex* in Jordan (1920c): No specific specimens. He primarily discussed the paleoecology of the Lompoc diatomite deposit and emphasized that the bay in which the diatomite was deposited was a spawning ground for an extraordinary large number of †*X. grex*.

Referred Specimens of †***X. grex*** in Jordan (1921a:242): From type locality: three slabs, whereabouts unknown: SU 58, 59, and 419, each with 60, 40, and 65 skeletons, respectively.

Referred Specimens of †***X. fitgeri*** in Jordan (1921a:243): No specific specimens mentioned.

Referred Specimens of †***X. grex*** in Jordan (1922b): No specific specimens mentioned. He referred to Jordan (1920c) where he discussed the paleoecology of †***X. grex***.

Referred Specimens of †***X. grex*** in David (1943:54): From LACM (CIT) locality 326, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10016, 10115, 10164, all counterparts; numerous fragments of counterparts (LACM 1189-1190, 1192, 1195-1196, 1198, 1203-1204, 1206, and 1283 (see Remarks).

From LACM (CIT) localities 326 and 329, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; five uncatalogued specimens in the collection of R. W. Frazier, numbers 2-8 and 10-14, whereabouts unknown.

Referred Specimens of †***X. grex*** in David (1943:91), text-fig. 16: From unknown locality, formation and age: LACM (CIT) 10262, right counterpart (see Remarks).

Referred Specimens of †***X. grex*** in David (1943:93, table): David compared †***Clupea tiejei*** with three specimens of †***X.grex***.

From type locality:one from slab LACM 1022, whereabouts unknown, and another from an uncatalogued slab.

From Alhambra, age and formation unknown: A third specimen, LACM 1015, whereabouts unknown.

Referred Specimens of †***X. grex*** in David (1944:38, text-fig. 5, figs. 1-3, pl. 3, figs. 29a, b): From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene (Mohnian), Los Angeles County; three scales (text-fig. 5, figs. 1-3, whereabouts unknown.

From Western Gulf Oil Company Symons well no. 12-17, Buena Vista District, San Joaquin Valley, formation not given, Middle-Late Miocene (Mohnian), Kern County; scales and opercular bones (unfigured), whereabouts unknown.

Referred Specimens of †***X. grex*** in Pierce (1956:1308, pl. 144, fig. 1): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3634, scale, whereabouts unknown.

Referred Specimens of †***X. grex*** in Grande (1985:251): From type locality: 30 specimens (AMNH 11208) and the holotype.

Referred Specimens of †***X. grex*** in Brace-Thompson (1994:68-72, unnumbered fig.): From type locality: mentions several specimens and figures the right counterpart of one.

Referred Specimens of †***X. grex*** in Frickhinger (1995): He figured one specimen housed in the FMNH. There was no museum number and the locality was given only as Miocene of Lompoc.

Referred Specimens in Huddleston and Takeuchi (2006:table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens.

Remarks: Jordan and Gilbert (1919) list SU 108 as the holotype from Lompoc, however the figure legend for plate 10, fig. 1 states that the specimen SU 18 is from Bairdstown (= El Sereno neighborhood of east Los Angeles), yet nowhere in the description is SU 18 mentioned. It is possible that SU 18 is mislabeled and is really SU 108, the holotype from Lompoc. Jordan and Gilbert (1920:9) noted that the original description of †***X. grex*** in Jordan and Gilbert (1919:25) mistakenly gave the locality as Bairdstown when it should have been Lompoc. Grande (1985:323) noted that David (1943:90) suggested that all specimens of †***Xyrinius*** probably belong to †***X. grex***. Because this was not a positive decision, we recognize the genus †***Xyrinius*** (see listings below). The LACM database lists specimen LACM 1192 as ***Lompoquia*** and gives no locality data for specimen LACM (CIT) 10262.

Genus †***Xyrinius*** Jordan and Gilbert 1919a
†***Xyrinius houshi*** Jordan and Gilbert 1919a

Selected Synonymy & References

†***Xyrinius houshi*** Jordan and Gilbert 1919a:50, pl. 31, fig. 2.

†***Xyrinius houshi*** Jordan and Gilbert: Jordan 1921a:244-245.
†***Xyrinius houshi*** Jordan and Gilbert: David 1943:90.
†***Xyrinius houshi*** Jordan and Gilbert: Grande 1985:323.

Type Specimen: †***Xyrinius houshi*** Jordan and Gilbert 1919a, holotype, SU 25, right counterpart, whereabouts unknown. **Labridae**.

Type Locality: Los Angeles, exact age and formation not given, but Jordan and Gilbert (1919a:50) listed it as Monterey or Puente formation, Los Angeles County.

Referred Specimens in Jordan and Gilbert (1919a): None.

Referred Specimens in Jordan (1921a): None. Notes that original account was erroneous and now placed the species in the **Clupeidae**.

Referred Specimens in (David 1943): None. Suggests, but does not include †***X. houshi*** in the synonymy of †***X. grex***. **Clupeidae**.

Referred Specimens in Grande (1985): None. Repeats the suggestion by David (1943) that †***X. houshi*** may be a subjective junior synonym of †***X. grex***. **Clupeidae**.

†*Xyrinius barbarae* (Jordan and Gilbert 1919a)

Selected Synonymy & References

†***Ellimma barbarae*** Jordan and Gilbert 1919a:27, pl. 9, fig. 3.
†***Xyne barbarae*** (Jordan and Gilbert): Jordan and Gilbert 1920:11.
†***Xyrinius barbarae*** (Jordan and Gilbert): Jordan 1921a:244.
†***Xyrinius barbarae*** (Jordan and Gilbert): David 1943:90.
†***Xyrinius barbarae*** (Jordan and Gilbert): Grande 1985:323.

Type Specimen: †***Ellimma barbarae*** Jordan and Gilbert 1919a, holotype, SU 32, right counterpart, whereabouts unknown.

Type Locality: Carpenteria, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan and Gilbert (1919a): None. **Clupeidae**.

Referred Specimens in Jordan and Gilbert (1920): None. They “temporarily” included †***Ellimma barbarae*** in †***Xyne***. **Clupeidae**.

Referred Specimens in Jordan (1921a): None. Placed †***Ellimma barbarae*** in the genus †***Xyrinius***.

Referred Specimens in David (1943): None. Suggested, but did not include †***X. barbarae*** in the synonymy of †***X. grex***.

Referred Specimens in Grande (1985): None. Repeated the suggestion by David (1943) that †***X. barbarae*** may be a subjective junior synonym of †***X. grex***. **Clupeidae**.

†*Xyrinius elmodenae* (Jordan and Gilbert 1919a)

Figure 14

Selected Synonymy & References

†***Ellimma elmodenae*** Jordan and Gilbert 1919a:27, pl. 9, fig. 3.
†***Xyne elmodenae*** (Jordan and Gilbert): Jordan and Gilbert 1920:11.
†***Xyrinius elmodenae*** (Jordan and Gilbert): Jordan 1921a:244.
†***Xyrinius elmodenae*** (Jordan and Gilbert): David 1943:90.
†***Xyrinius elmodenae*** (Jordan and Gilbert): Grande 1985:323.

Type Specimen: †***Ellimma elmodenae*** Jordan and Gilbert 1919a, holotype, CAS 55404 (SU 47), well-preserved left counterpart.

Type Locality: El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimens: None. **Clupeidae**.

Referred Specimens in Jordan and Gilbert (1920): None. They “temporarily” included †***Ellimma barbarae*** in †***Xyne***.

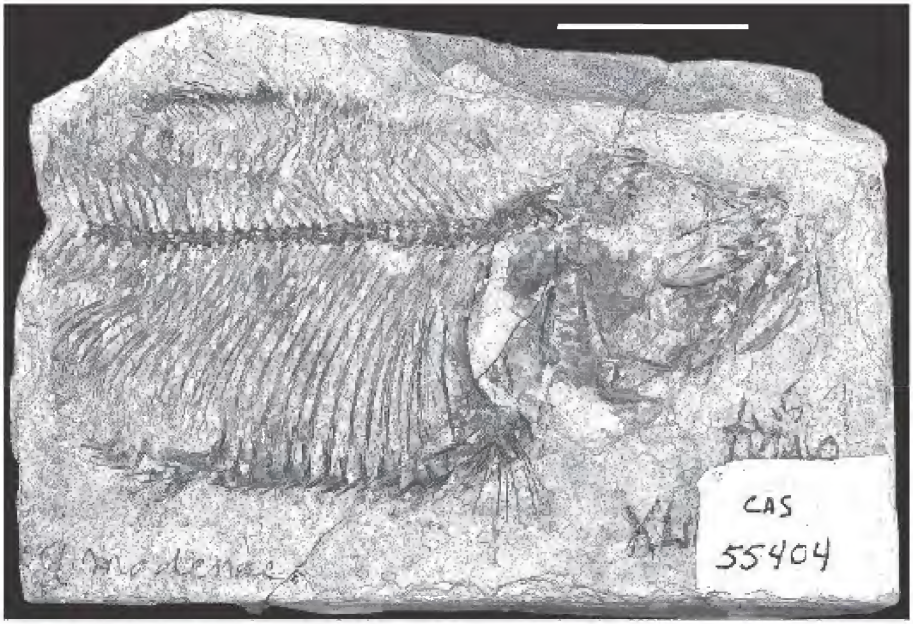


FIGURE 14. †*Xyrinius elmodenae* (Jordan and Gilbert 1919a), holotype, CAS 55404 (from color image provided by CAS); scale bar equals 2 cm.

Referred Specimens in Jordan (1921a): None. Placed †***Ellimma elmodenae*** in the genus †***Xyrinius***.

Referred Specimens in David (1943): None. Suggested, but did not include †*X.* ***elmodenae*** in the synonymy of †*X. grex*.

Referred Specimens in Grande (1985): None. Repeated the suggestion by David (1943) that †*X.* ***elmodenae*** may be a subjective junior synonym of †***X. grex***. **Clupeidae.**

Family **Clupeidae** genus and species undetermined: David 1944:33-34, pl. 3, figs. 25, 28

Referred Specimens in David (1944): From Texas Company Newman well number 1, Kern River District, San Joaquin Valley, formation not given, Early Miocene (Saucesian-Relizian), Kern County; two scales (pl. 3, figs. 25, 28), whereabouts unknown.

Order **Cypriniformes**

Family **Catostomidae**

Genus ***Catostomus*** Lesueur 1817

†***Catostomus cristatus*** Cope 1883

Figure 15

Selected Synonymy & References

†***Catostomus cristatus*** Cope 1883:160.
†***Catostomus cristatus*** Cope: Hussakof 1908:65, text-figs. 33.
†***Catostomus cristatus*** Cope: Gilbert 1998:179.
Catostomus **sp.**: Taylor and Smith 1981:350, pl. 19, figs. 3-6.

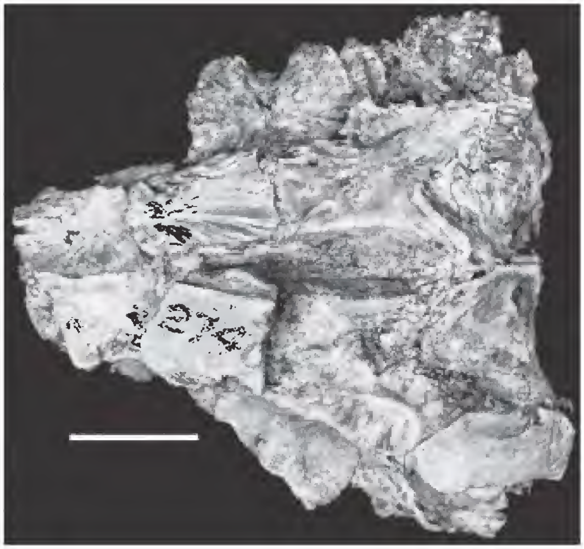


FIGURE 15. †*Catostomus cristatus* Cope 1883, holotype, AMNH 2740 [image courtesy of John Maisey, Lorraine Meeker, and Chester Tarka (AMNH)]; scale bar equals 1 cm.

†***Catostomus cristatus*** Cope: Smith 1975:23-29, 32. figs. 9D, 10A-D, 12C, G.
†***Catostomus cristatus*** Cope: Smith et al. 2002:216.

Type Specimen: †***Catostomus cristatus*** Cope 1883, holotype, AMNH 2740, cranial fragment.
Type Locality: Lake Idaho, Glenns Ferry Formation, Early Pliocene, Idaho.
Referred Specimens in Hussakof (1908): None. He briefly described and figured the holotype (fig. 33) and noted that it was collected in the Pleistocene of Southwest Idaho.
Referred Specimens of †*C. cristatus* in Smith (1975): No California specimens mentioned.
Referred Specimens of *Catostomus* sp. in Taylor and Smith (1981): From Locality B, Honey Lake, upper Alturas Formation, mid-Pliocene, Lassen County; UMMP V74704, right and left maxillae (fig. 3); UMMP V74703, three dentary elements (figs. 4-6). See entries below under †***Catostomus* sp.**
Referred Specimens of †*C. cristatus* in Smith et al. (2002:216): From Honey Lake "Island", upper Alturas Formation, mid-Pliocene, Lassen County; a complete maxilla, no museum number. They reidentified the maxillae (fig. 3) and two of the dentaries (figs. 5, 6) figured by Taylor and Smith (1981) as †***C. cristatus*** (see above entry).
Distribution of Neogene †*C. cristatus* outside of California: Pliocene of Snake River Plain.

†***Catostomus shoshonensis*** Cope 1883

Figure 16

Selected Synonymy & References

†***Catostomus shoshonensis*** Cope 1883:159-160.
"†***Catostomus reddingi***" Cope: Hussakof 1908:66, fig. 34.
Catostomus sp.: Taylor and Smith 1981:350.
†***Catostomus shoshonensis*** Cope:Smith 1975:29.
†***Deltistes shoshonensis*** Cope: Gilbert 1998:200.
†***Catostomus shoshonensis*** Cope: Smith et al. 2002:216.

Type Specimen: †***Catostomus shoshonensis*** Cope 1883, holotype, AMNH 2761, cranium (Gilbert 1998:197).
Type Locality: Lake Idaho, Glenns Ferry Formation, Early Pliocene ([according to Gilbert (1998:200), the age is Late Pliocene-Early Pleistocene], southern Idaho.

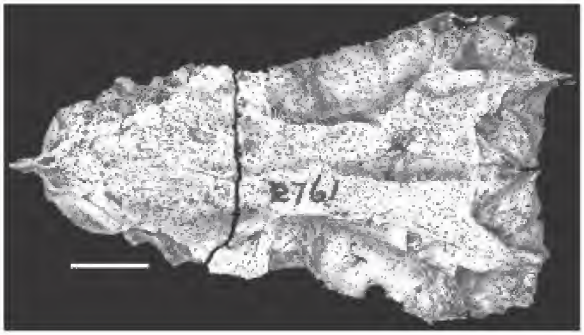


FIGURE 16. †*Catostomus shoshonensis* Cope 1883, holotype, AMNH 2761 [image courtesy of John Maisey, Lorraine Meeker, and Chester Tarka (AMNH)]; scale bar equals 1 cm.

Referred Specimens of *Catostomus* sp. in Taylor and Smith (1981): see entry below on *Catostomus* **sp.**

Referred Specimens in Smith (1975): No California specimens mentioned.

Referred Specimens in Smith et al. (2002): From Honey Lake, upper Alturas Formation, mid-Pliocene, Lassen County; mentioned that some of the maxillae described by Taylor and Smith (1981) belong to †*C. shoshonensis*. No specific specimen was identified.

Distribution of Neogene †*C. shoshonensis* outside of California: Miocene and Pliocene of the Snake River Plain.

Remarks: According to Smith (1975), Cope (1883) added confusion to the literature when he apparently substituted the name *shoshonensis* for material he intended to name *C. reddingi*. Hussakof 1908) referred to the undescribed specimen as "*C. reddingi*" while the holotype of †*C. shoshonensis* was supposed to be unknown. Smith (1975) stated that the description and measurements of †*C. shoshonensis* (Cope 1883:159-160) clearly refer to AMNH 2761, labeled as the type of "†*Catostomus reddingi* Cope". Gilbert (1998:200) recognized the species as †*Deltistes shoshoensis* (Cope).

†*Catostomus* sp.

Referred Specimens in Taylor and Smith (1981:350, pl. 19, figs. 3-6): From Locality B, Honey Lake, upper Alturas Formation, mid-Pliocene, Lassen County; there were five maxillae and five dentaries, but only the following five specimens were specifically mentioned: UMMP V74704, right and left maxillae (fig. 3); UMMP V74703, three dentary elements (figs. 4-6). They stated that the dentaries resemble †*C. cristatus* Cope, and the maxillae resemble †*C. shoshonensis* Cope.

Referred Specimens of †*Catostomus* in Wagner et al. (1997): From UCMP locality V 95030, Signal Butte local fauna, upper Alturas Formation, mid-Pliocene, Modoc County; no individual specimens were listed, but the specimens were deposited at UCMP and their catalog lists specimens 143065-143072 as catostomids.

From Canby Bluffs local fauna, upper Alturas Formation, mid-Pliocene, Modoc County; no individual specimens were mentioned.

From Secret Valley-Mudflat local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no individual specimens were mentioned.

From Honey Lake "Island" local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; mentioned specimens in Taylor and Smith (1981) [see above].

Referred Specimens of †*Catostomus* in Smith et al. (2002:188-190, 216): From Secret Valley, upper Alturas Formation, mid-Pliocene, Lassen County; mentions dentaries and maxillae, but no museum numbers.

From Mono Basin, mid-Pliocene, Mono County; mentions a dentary and maxillae, but no museum numbers.

Referred Specimens of †*Catostomus* in Smith et al. (2009:177-182, figs. 2a, b, f, i, j, k): From Keeler South:

Owens Lake Clay, Plio-Pleistocene, Inyo County; pharyngeal arch and teeth (fig. 2i) and Weberian apparatus (fig. 2j) [UMMP 50905-50906].

From Keeler South: Owens Lake Sand, mid-Pliocene, Inyo County; posterior maxilla (fig. 2a), anterior maxilla (fig. 2b), urohyal (fig. 2f) and Weberian rib (fig. 2k) [50895-50898].

Remarks: Smith et al. (2009:179-180) in the text describe specimens UMMP 50895-50898 and 50905-50906 as though they are either †***Catostomus fumeiventris*** and †***C. tahoensis***, but in the legend of figure 2 they identify the specimens only as †***Catostomus* sp.**

Genus *Chasmistes* Jordan 1878

Chasmistes cf. *C. cujus* Cope 1883: Taylor and Smith 1981:350, pl.19, figs. 9, 10

Referred Specimens: From Honey Lake, upper Alturas Formation, mid-Pliocene, Lassen County; Locality A: one maxilla (no specimen number or figure); Locality B: UMMP V74462, right opercle (fig. 9) and UMMP V74461, left hyomandibular (fig. 10) and several other skull bones without catalogue numbers or figures. The figure legend of plate 19 identifies UMMP V74461 and V74462 as ***Chasmistes* sp.** not ***Chasmistes* cf. *C. cujus***.

Remarks: Miller and Smith (1981:30) identified UMMP V74461-V74462 as ***Chasmistes* sp.** (see next entry).

†*Chasmistes* sp.

Referred Specimens in Miller and Smith (1981:30, figs. 11F, G): From Secret Valley, upper Alturas Formation, mid-Pliocene, Lassen County; Specimens UMMP V74464 (fig. 11F), V74465 and V74466.

From Honey Lake "Island", upper Alturas Formation, mid-Pliocene, Lassen County; Specimens UMMP V74461-74463.

From Madeline Plains local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned, but according to Gobalet (pers. comm., May 3, 2010), the material consists of seven dentaries, three maxillae, and a pleural rib.

From Mono Lake Basin, formation not given, Late Pliocene, Mono County; Specimens UMMP V74484 (fig. 11G), V74485 and V74486.

Referred Specimens in Wagner et al. (1997): From Signal Butte local fauna, upper Alturas Formation, mid-Pliocene, Modoc County; no individual specimens were listed, but the specimens were deposited at UCMP and their catalog lists specimens 143065-143072 as catostomids (see entry above for Wagner et al. under ***Catostomus* sp.**).

Referred Specimens in Smith et al. (2002): From Mono Basin, formation not given, Late Pliocene, Mono County; no specific specimen mentioned. The authors make general statements that the skull, maxillae and dentaries compare favorably in part to †***C. batrachops*** Cope 1883 from Fossil Lake, Oregon and Snake River Plain, and to the specimens from Secret Valley, Lassen County.

From Honey Lake "Island", upper Alturas Formation, mid-Pliocene, Lassen County; no specific specimen mentioned. The authors state that Honey Lake specimens are intermediate between ***C. cujus*** of the Lahontan Basin system and ***C. spatulifer*** Miller and Smith 1967 of the Snake River Plain.

Remarks: Smith et al. (2002:215) identified the specimens from the Mono Basin as †***Chasmistes* sp.** undetermined. According to K. Gobalet (pers. comm., May 3, 2010), the specimens of †***Chasmistes* sp.** studied by Smith et al. (2002) included 39 partial dentaries, nine maxillary fragments, one palatine, one ethmoid, two anguloarticulars, and numerous gill rakers.

Genus *Xyrauchen* Eigenmann and Kirsch 1889

Xyrauchen texanus (Abbott 1860)

Selected Synonymy & References (fossils only)

Xyrauchen texanus (Abbott): Stewart and Roeder 1993:94-96, fig.1 (restoration).
Xyrauchen texanus (Abbott): Gilbert 1998:202.

Xyrauchen texanus (Abbott): Hoetker and Gobalet 1999:755-759, text-fig. 1.
Xyrauchen texanus (Abbott): Nelson et al. (2004:80, 205).

Type Specimen: Extant, ***Catostomus texanus*** Abbott 1860, holotype, ANSP 16993 (dry specimen). See Remarks.

Type Locality: Colorado and New Rivers, Arizona (Lee et al., 1980).

Referred Specimen in Stewart and Roeder (1993): From Anza-Borrego Desert, San Felipe Hills, Diablo Formation, Early Pliocene, Imperial County; SBCM A768-1, both counterparts of a nearly complete specimen,.

Referred Specimen in Hoetker and Gobalet (1999): Same specimen reported by Stewart and Roeder (1993) with a much more complete description and comparison with other catostomids. The authors noted that the locality and stratigraphic information is imprecise, thus the age could be Pleistocene, although unlikely.

Remarks: We follow Gilbert (1998:202) and Nelson et al. (2004:205) and correct the date of publication from Abbott (1861) to Abbott (1860).

Family **Cyprinidae**

Genus *Acrocheilus* Agassiz 1855

†***Acrocheilus* cf. *A. latus*** (Cope 1870)

Figure 17

Selected Synonymy & References

†***Anchybopsis latus*** Cope 1870:543: Smith 1975:37.
†***Diastichus macrodon*** Cope 1870:539: Smith 1975:37.
†***Leucus latus*** Cope 1883:156: Smith 1975:37.
†***Diastichus strangulatus*** Cope 1883:158: Smith 1975:37.
†***Sigmopharyngodon idahoensis*** Uyeno 1961:336: Smith 1975:37.
†***Acrocheilus xestes*** Miller and Smith 1967:3: Smith 1975:37.
†***Acrocheilus latus*** (Cope): Smith 1975:37.
†***Acrocheilus* cf. *A. latus*** (Cope) or †***Acrocheilus* cf. *A. xestes*** Miller and Smith: Wagner et al. 1997:15.
†***Acrocheilus latus*** (Cope): Gilbert 1998:25, 101.

Holotype and Type Locality of †***Anchybopsis latus*** Cope (1870): USNM 2120, two pharyngeals from Glenns Ferry Formation, Plio-Pleistocene, southern Idaho.

Holotype and Type Locality of †***Diastichus macrodon*** Cope (1870:539): From Glenns Ferry Formation [Miller and Smith (1967)], Plio-Pleistocene, Catherine Creek, Owyhee County, Idaho: USNM 9792, three pharyngeals.

Holotype and Type Locality of †***Diastichus strangulatus*** Cope (1883:158): From type locality of †***Anchybopsis latus*** Cope: AMNH 2764.

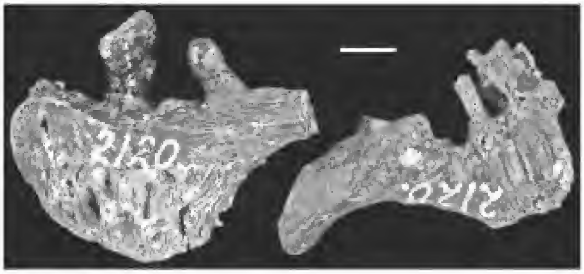


FIGURE 17. †*Acrocheilus latus* (Cope 1870), holotype, USNM 2120, (from color image, © Smithsonian Institution, all rights reserved); scale bar equals 5 mm.

Holotype and Type Locality of †***Sigmopharyngodon idahoensis*** Uyeno (1961:336): From USGS locality 19213, Hagerman Formation, Early Pleistocene, Twin Falls County, Idaho: USNM 21900, left pharyngeal.

Holotype and Type Locality of †***Acrocheilus xestes*** Miller and Smith (1967:3): From Glenns Ferry Formation, Plio-Pleistocene, Owyhee County, Idaho: UMMP V55546, a nearly complete right dentary.

Referred Specimens of †***Acrocheilus* cf. *A. latus*** (Cope) or †***Acrocheilus* cf. *A. xestes*** Miller and Smith in Wagner et al. (1997:15): From UCMP locality V95030, Signal Butte local fauna, upper Alturas Formation, Early Pliocene, Modoc County; no specific specimens were identified. (see Remarks).

Distribution of Neogene †***A. latus*** (Cope) outside of California: Washington (mid-Late Pliocene) (Smith et al. 2000); Idaho (Plio-Pleistocene).

Remarks: According to Smith (1975:37), Uyeno (1961:342) mistakenly listed †***Sigmopharyngodon idahoensis*** as †***S. hagermanensis***. We think the either/or identification by Wagner et al. (1997) is confusing and taxonomically incorrect because both Smith (1975) and Gilbert (1998) placed †***A. xestes*** in the synonymy of †***A. latus***.

†*Acrocheilus* sp.

Referred Specimens in Wagner et al. (1997:16-17): From Madeline Plains local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

From Secret Valley-Mudflat local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

Remarks: Wagner et al. (1997:16) stated that the Madeline Plains local fauna may contain a new species of ***Acrocheilus***. On the other hand, Smith et al. (2002:211) suggested that "…fossils reported as ***Acrocheilus*** from the Madeline Plains may be highly variable ***Lavinia***."

Genus ***Gila*** Baird and Girard 1853

Gila coerulea (Girard 1856b)

Selected Synonymy & References (primarily fossils only)

Cheonda coerulea Girard 1856b:207.
***Gila* sp.**: Taylor and Smith 1981:349, pl. 18, figs. 1, 2, 6,7 .
Gila coerulea (Girard): Lee et al. 1980:162.
Gila* cf. *G. coerulea (Girard): Wagner et al. 1997:15.
Gila coerulea (Girard): Gilbert 1998:17, 49, 61.
Gila coerulea (Girard): Eschmeyer 1998:392.
Klamathella coerulea (Girard): Smith et al. 2002:211.
Gila coerulea (Girard): Nelson et al. 2004:70, 198.

Type Specimen: Extant, ***Cheonda coerulea*** Girard 1856b, holotype, USNM 237.

Type Locality: Lost River, Oregon.

Referred Specimens of ***Gila* sp.** in Taylor and Smith (1981:349, pl. 18, figs. 1, 2, 6, 7): From Honey Lake, upper Alturas Formation, mid-Pliocene, Lassen County; Locality A: three dentaries (no museum numbers). Locality B: UMMP 74705, three pharyngeals (figs. 1, 2); UMMP 74714, 12 dentaries (fig. 7); one maxilla (no museum number); one hyomandibula (no museum number); UMMP 74713, two parietals (fig. 6); one articular (no museum number).

Referred Specimens of ***Gila* cf. *G. coerulea*** in Wagner et al. (1997:15): From UCMP locality V95030, Signal Butte local fauna, upper Alturas Formation, mid-Pliocene, Modoc County; no specimens mentioned, but according to K. Gobalet (pers. comm., May 3, 2010), the specimens of ***G.* cf. *G. coerulea*** studied from this locality include seven pharyngeals, three dentaries, and a basioccipital. See Remarks section below.

From Madeline Plains local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned. According to K. Gobalet (pers. comm., May 3, 2010), the specimens of ***G.* cf. *G. coerulea*** studied from this locality include 32 pharyngeals (UCMP 142520-142552), a dentary, and a basioccipital.

Referred Specimens ***Klamathella coerulea*** in Smith et al. (2002:211): No specific specimens or localities mentioned, except that ***Klamathella*** fossils are found in Pliocene sediments at Honey Lake, Madeline Plains and Alturas Valley (= Signal Butte).

Remarks: The UCMP catalogue lists the following specimens from locality UCMP V95030 under the general identification of Cyprinidae: UCMP 142467-142589. We follow Gilbert (1998), Eschmeyer (1998), and Nelson (2004) by recognizing the genus ***Gila*** rather than ***Klamathella***.

Genus *Lavinia* Girard 1854a
†*Lavinia* sp.

Referred Specimens in Wagner et al. (1997:16): From Madeline Plains local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

Referred Specimens in Smith et al. (2002:193, 207, 209, table 1): From Madeline Plains local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

From Secret Valley-Mudflat local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

From Mono Basin, Late Pliocene, Mono County; no specimens mentioned.

Remarks: See Remarks section for ***Acrocheilus***.

Genus *Orthodon* Girard 1856b
Orthodon sp.

Referred Specimens in Casteel and Hutchison (1973:358-361, figs. 3d-3f): From UCMP locality V6878, Mehrten Formation, Late Miocene (Hemphillian), Stanislaus County; UCMP 96299, 41 teeth.

Referred Specimens in Casteel (1978:296): From USGS vertebrate locality M-1219, Santa Clara Formation, Plio-Pleistocene, near Saratoga, Santa Clara County; no specific specimens mentioned.

Referred Specimens in Smith (1981:table 2): No specific locality or specimens mentioned.

Genus *Ptychocheilus* Agassiz 1855
†*Ptychocheilus* cf. *P. arciferus* (Cope 1870)

Selected Synonymy & References

†***Oligobelis arciferus*** Cope 1870:541.
†***Oligobelis laminatus*** Cope 1870:541: Smith 1975:35.
†***Semotilus posticus*** Cope 1870:541: Smith 1975:35.
†***Semotilus bairdii*** Cope 1870:542: Smith 1975:35.
†***Squalius arciferus*** (Cope): Cope 1883:157-158: Smith 1975:35.
†***Squalius posticus*** (Cope): Cope 1883:157: Smith 1975:35.
†***Squalius laminatus*** (Cope): Cope 1883:157: Smith 1975:35.
†***Squalius reddingi*** Cope 1883:157: Smith 1975:35.
†***Squalius bairdi*** (Cope): Cope 1883:157: Smith 1975:35.
†***Leuciscus reddingi*** (Cope): Hussakof 1908:80: Smith 1975:35.
†***Ptychocheilus* cf. *P. arcifer***: Wagner et al. 1997:15.

Holotype and Type Locality of †***Oligobelis arciferus*** Cope (1870:541): USNM specimens 9782, 9791 [according to Uyeno and Miller (1963), the specimens may be lost or misplaced], probably from Glenns Ferry Formation [Miller and Smith (1967)], Plio-Pleistocene, Catherine Creek, Owyhee County, Idaho.

Holotype of †***Oligobelis laminatus*** in Cope 1870:541: From same type locality as †***O. arciferus***: USNM 9791 [according to Uyeno and Miller (1963), the specimen may be lost or misplaced].

Holotype of †***Semotilus posticus*** in Cope (1870:542): From same type locality as †***O. arciferus***: USNM 1489 [according to Uyeno and Miller (1963), the specimen may be lost or misplaced].

Holotype of †***Semotilus bairdii*** in Cope (1870:542): USNM 1482 [according to Uyeno and Miller (1963), the specimen may be lost or misplaced].

Referred Specimens of †***Squalius posticus*****,** †***S. laminatus*****,** and †***S. arciferus*** in Cope (1883:157-158): Extant new specimens, only the holotypes.

Referred Specimens of †***Squalius bairdi*** in Cope (1883:158): From the type locality, presumably: mentions the holotype and a newly discovered left pharyngeal (no catalogue number).

Holotype and Type Locality of †***Squalius reddingi*** in Cope (1883:157): From the Pleistocene, southern Idaho, no formation given: AMNH 2767, three pharyngeal bones [see Hussakof (1908:80)].

Referred Specimens of †***Leuciscus reddingi*** (Cope) in Hussakof (1908:80): Only the holotype, no new specimens (see above entry).

Referred Specimens of †***Ptychocheilus* cf. *P. arciferus*** (Cope) in Wagner et al. (1997:15): From UCMP localities V95030 and V95031, Signal Butte local fauna, upper Alturas Formation, Early Pliocene, Modoc County; no specific specimens were identified. The authors misspelled the specific name ***arciferus*** as ***arcifer***. See Remarks section below.

Distribution of Neogene †***P. arciferus*** (Cope) outside of California: Oregon and Idaho (Late Miocene), Washington, (mid-Late Pliocene) (Smith et al. 2000); Idaho (Plio-Pleistocene).

Remarks: The UCMP catalogue lists the following specimens under the general identification of Cyprinidae: from UCMP locality V95030: UCMP 142467-142589 and from UCMP locality V95031: UCMP 142596-142598 and 143155-143160. Gilbert (1998:32, 42) gives a synonymy of †***Ptychocheilus arciferus*** (Cope 1871). Note the date is 1871, not 1870 as given in Jordan (1920b) and Smith (1975).

†*Ptychocheilus* sp.

Referred Specimens in Miller and Smith (1981:31): From Mono Basin, Late Pliocene, Mono County; no specimens mentioned.

Referred Specimens in Wagner et al. (1997): From Madeline Plains local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

From Secret Valley-Mudflat local fauna, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

From Mono Basin, Late Pliocene, Mono County; no specimens mentioned.

Genus ***Siphateles*** Cope 1883

Remarks: Gilbert (1998), Eschmeyer (1998), and Nelson (2004) placed ***Siphateles*** in the synonymy of ***Gila***, however we follow Smith et al. (2002, 2009) and others and recognize ***Siphateles*** as a distinct genus.

Siphateles bicolor (Girard 1856a)

Selected Synonymy & References (primarily fossils only)

Algansea bicolor Girard 1856a:183.
Tigoma bicolor Girard 1856a:206.
Gila bicolor (Girard): Gilbert 1998:49.
Gila bicolor (Girard): Eschmeyer 1998:222.
Gila bicolor (Girard): Nelson et al. 2004:70.
Siphateles bicolor (Girard): Smith et al. 2009:178.

Type Specimen: Extant, ***Algansea bicolor*** Girard 1856a:183, holotype, USNM 192 plus one right pharyngeal catalogued as USNM 2750 (Gilbert 1998:48; extant, ***Tigoma bicolor*** Girard 1856a:206, syntypes, USNM 234 (Eschmeyer 1998:222).

Type Locality: Klamath Lake, Oregon.

Referred Specimens in Smith et al. (2009:178, fig. 3): From Keeler South: Owens Lake Clay, Owens Valley, Plio-Pleistocene, Inyo County; represented by several opercles (fig. 3), hyomandibulae, vertebrae, scales, and miscellaneous non-diagnostic fragments.

Siphateles mohavensis Snyder 1918

Selected Synonymy & References (primarily fossils only)

Siphateles mohavensis Snyder 1928:298.
Gila bicolor mohavensis (Girard): Gilbert 1998:115-116.
Siphateles mohavensis Snyder: Eschmeyer 1998:1110.
Siphateles mohavensis Snyder: Smith et al. 2002:209.
Siphateles mohavensis Snyder: Smith 2009:181.

Type Specimen: Extant, ***Siphateles mohavensis*** Snyder 1918:298, holotype, USNM 76837 (Eschmeyer 1998:1110).

Type Locality: Mohave (= Mojave) River, near Victor (= Victorville?), California, USA.

Referred Specimens in Smith et al. (2002:209): From White Hills near Airport Lake, formation not stated, Plio-Pleistocene, Inyo County; no specific specimens mentioned.

Referred Specimens in Gobalet (2005:4): From Mono Basin, formation not stated, Late Pliocene, Mono County; unspecified specimens of †***S. mohavensis*** were described as a new species, †***S. davidgainesi***, but unfortunately the description remains unpublished, therefore the new name is unavailable.

†***Siphateles*** **sp.**

Referred Specimens in Smith et al. (2002:209-210, table 1): From Mono Basin, formation not stated, Late Pliocene, Mono County; mentions dentaries and masticatory plates, but no museum numbers.

From Honey Lake, upper Alturas Formation, mid-Pliocene, Lassen County; no specimens mentioned.

Referred Specimens in Smith et al. (2009:178-179, figs. 3a, j; 4c-e): From Keeler South: Owens Lake Sand, Owens Valley, mid-Pliocene, Inyo County; specimens (UMMP 50899-50903) consist of one complete and two partial pharyngeal bones, 40 isolated teeth, 25 partial dentaries, three hyomandibulae, eight ceratohyals, two partial urohyals, four partial maxillae, one palatine, nine opercle fragments, three preopercles, four post-temporals, a basioccipital, five frontals, eight parietals, additional skull bones, and Weberian ribs.

Order **Argentiniformes**

Family **Argentinidae**

Genus ***Argentina*** Linnaeus 1758
Argentina **sp.**

Referred Specimens in Huddleston and Takeuchi (2006: 33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens, just remains are present.

Family **Microstomatidae**

Remarks: We follow Nelson (2006:191-192) and consider the Bathylagids as a subfamily, Bathylaginae, of Microstomatidae.

Genus †***Bathylagus*** Günther 1878
†***Bathylagus angelensis*** (Jordan and Gilbert 1919a)

Figure 18

Selected Synonymy & References

†***Azalois angelensis*** Jordan and Gilbert 1919a:32, pl. 15, fig. 2.
†***Azalois angelensis*** Jordan 1921a:249, pl. 23a (restoration).

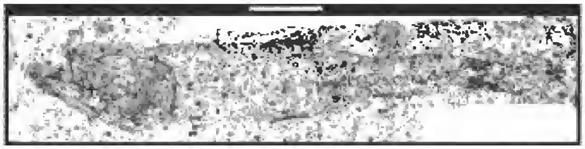


FIGURE 18. †*Bathylagus angelensis* (Jordan and Gilbert 1919a), holotype, CAS 70000 (from color image provided by CAS); scale bar equals 1 cm.

†***Lygisma tenax*** Jordan and Gilbert 1919a:33-34, pl. 8, fig. 2, pl. 14, fig. 1.
†***Lygisma tenax*** Jordan and Gilbert: Jordan and Gilbert 1920:12.
†***Lygisma tenax*** Jordan and Gilbert: Jordan 1921a:248, pl. 21.
†***Quaesita quiescens*** Jordan 1925:11, pl. 3a.
†***Bathylagus* (*Quaesita*) *angelensis*** (Jordan and Gilbert):David 1943:55-59, pl. 7, fig 3, pl. 8, fig. 4, pl. 9, figs. 3, 4; text-figs 10a-d.
†***Bathylagus* (*Quaesita*) *angelensis*** (Jordan and Gilbert):David 1943:123.
†***Bathylagus* (*Quaesita*) *angelensis*** (Jordan and Gilbert):Pierce 1956:1308-1310, pl. 144, fig. 5.
†***Bathylagus angelensis*** (Jordan and Gilbert): Frickhinger 1995:611, unnumbered figure.

Type Specimen: †***Azalois angelensis*** Jordan and Gilbert, holotype, CAS 70000 (SU 42), right counterpart (pl. 15, fig. 2). **Dussumieriidae.**

Type Locality: Bairdstown (= El Sereno neighborhood, east Lost Angeles), Monterey Formation, Late Miocene, Los Angeles County.

Referred Specimens of †*A. angelensis* in Jordan and Gilbert (1919a): None.

Referred Specimens of †*A. angelensis* in Jordan (1921a): None. **Gonostomatidae.**

Holotype of †*L. tenax* Jordan and Gilbert (1919a), reidentified by David (1943:55-59): From El Modena, Monterey Formation, Late Miocene, Orange County; CAS 69976 (SU 16), holotype, dorsal view (pl. 8, fig. 2).

Referred Specimens of †*L. tenax* in Jordan and Gilbert (1919a): From El Modena, Monterey Formation, Late Miocene, Orange County; CAS 55403 (SU 107), left counterpart (pl. 14, fig. 1) (specimen is labeled a paratype in the CAS collection). **Dussumieriidae.**

Referred Specimens of †*L. tenax* in Jordan and Gilbert (1920): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 79 and 121. **Clupeidae.**

Referred Specimens of †*L. tenax* in Jordan (1921a): None, but he states there are numerous uncatalogued specimens from Alhambra and Lompoc. **Dussumieriidae.**

Holotype of †*Q. quiescens* Jordan (1925) reidentified by David (1943:123): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55535 (SU 118, 526), holotype, two specimens on same right counterpart. No referred specimens. **Dussumieriidae.**

Referred Specimens of †*B. angelensis* (Jordan and Gilbert) in David (1943:55-59): From LACM (CIT) locality 326 or nearby, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10043 (pl. 9, fig. 3), right and left counterparts; 10112, right counterpart; 10113 (pl. 7, fig. 3), right counterpart; 10169 (pl. 9, fig. 4), right counterpart; 10170 (text-fig, 10a), right counterpart; 10171, left counterpart; seven specimens with whereabouts unknown, numbers 69-71, 74, 75, 76 (text-fig. 10b) and 86 in the collection of R. W. Frazier.

From LACM (CIT) locality 79, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10173-10178, all counterparts.

From LACM (CIT) locality 382, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10030, left counterpart; 10146 (pl. 8, fig. 4), left and right counterparts; numbers 200 and 201 in the collection of Los Angeles City College, whereabouts unknown. **Bathylagidae.**

Referred Specimens of †*B. angelensis* (Jordan and Gilbert) in David (1943:123): From LACM (CIT) locality 365, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; LACM (CIT) 10162, six specimens (counterparts) on one slab.

From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55604 (SU 190, 466), right counterpart; CAS 55535 (SU 118, 526), right counterpart; SU 191 (93), whereabouts unknown. **Bathylagidae.**

Referred Specimen of †***B. angelensis*** (Jordan and Gilbert) in Pierce (1956:1308-1310, pl. 144, fig. 5): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3638, right counterpart (pl. 144, fig. 5), whereabouts unknown.

Referred Specimens in Frickhinger (1995:611, unnumbered figure): He figured one specimen, a left counterpart, housed in the Siber and Siber collection, Aathal, Switzerland. There was no museum number and the locality was given only as Miocene of California.

Remarks: The LACM catalogue lists specimens, LACM (CIT) 10030 and 10146 from locality LACM (CIT) 329, not 382. David (1943:56) listed specimen LACM (CIT) 10173 from two localities, LACM (CIT) 379 and 380, however, the LACM catalogue lists the specimen from LACM (CIT) 379. David (1943:123) listed SU 118 (526) [= CAS 55535] as the holotype of †***B. angelensis*** (Jordan and Gilbert) and the type locality as Lompoc, thus her changes do not agree with Jordan and Gilbert's (1919a:32) type description!

Bathylagus sp.

Referred Specimens in Fitch and Lavenberg (1968:23-24): No specific specimens mentioned. They stated that "*Bathylagus* remains…have been found in many Miocene diatomite and shale deposits in Southern California, and otoliths of some species …are abundant in several Miocene and Pliocene deposits".

Genus †***Quaesita*** Jordan and Gilbert 1919a
†***Quaesita quisquilia*** Jordan and Gilbert 1919a

Figure 19

Selected Synonymy & References

†***Quaesita quisquilia*** Jordan and Gilbert 1919a:31-32, pl. 8, fig. 3, pl. 10, fig. 2, pl. 17, fig. 1.
†***Quaesita quisquilia*** Jordan and Gilbert: Jordan 1921a:246-247, pl. 22a (restoration).
†***Sternbergia waitei*** Jordan and Gilbert *in* Jordan 1925:41, pl. 20a.
†***Quaesita quisquilia*** Jordan and Gilbert: David 1943:10-11.

Type Specimen: †***Quaesita quisquilia*** Jordan and Gilbert 1919a, holotype, CAS 70012.01 (SU 17), right counterpart (pl. 17, fig. 1). **Dussumieriidae.**

Type Locality: El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimens of †***Q. quisquilia*** in Jordan and Gilbert (1919a): From type locality: CAS 55601 (SU 92), left counterpart; CAS 55435 (SU 119), right counterpart; the following specimens with whereabouts unknown: SU 93-118 and 120. See Remarks section below. **Dussumieriidae.**

Referred Specimens of †***Q. quisquilia*** in Jordan (1921a): Jordan mentioned the type from El Modena and referenced one specimen (SU 526), whereabouts unknown, from Lompoc. **Dussumieriidae.**

Holotype and Referred Specimens of †*Sternbergia waitei* Jordan and Gilbert *in* Jordan (1925:41) reidentified

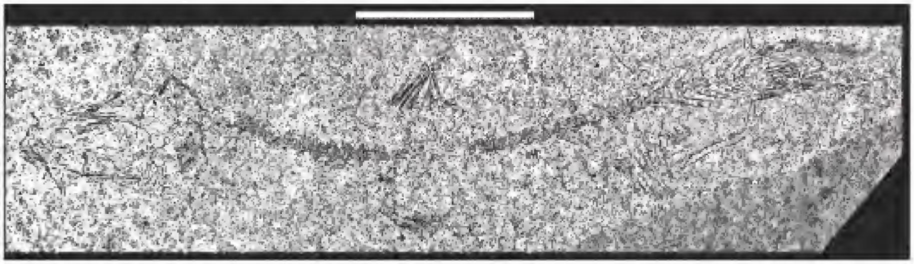


FIGURE 19. †*Quaesita quisquilia* Jordan and Gilbert 1919a, holotype, CAS 70012.01 (from color image provided by CAS); scale bar equals 2 cm.

by David (1943:11): From Covina, formation and age not stated, Los Angeles County; holotype, CAS 70114 (SU 689), headless right counterpart (pl. 20a). No referred specimens.

Referred Specimens in David (1943:10-11): LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10015 (counterpart); 10233 (left and right counterparts); 10234 (left and right counterparts); numbers 7, 10-11 of the Layton collection, whereabouts unknown; plus numerous other uncatalogued specimens.

Remarks: David (1943:11) stated that the types of ***Sternbergia waitei*** and †***Smithites elegans*** are lost and concluded that both species should be synonymized with †***Q. quisquilia***. However, the CAS collection contains the holotype of †***Sternbergia waitei*** [CAS 70114 (SU 689)]. She made an error including †***Smithites*** in the synonymy because Jordan (1927b:191) pointed out that he (Jordan and Gilbert 1919a) had mistakenly described †***Smithites elegans*** based on a photograph of an Austrian fossil clupeid, therefore the scientific name belongs to the Austrian specimen not to the one from California.

†*Quaesita alhambrae* Jordan and Gilbert 1920

Selected Synonymy & Reference

†*Quaesita alhambrae* Jordan and Gilbert 1920:43, pl. 28

Type Specimen: †***Quaesita alhambrae*** Jordan and Gilbert 1920, SU 198, right counterpart, whereabouts unknown. **Dussumieriidae.**

Type Locality: Near Alhambra, formation and age not stated, Los Angeles County.

Referred Specimens: None.

†*Quaesita fragilis* Jordan and Gilbert 1920

Figure 20

Selected Synonymy & References

†*Quaesita fragilis* Jordan and Gilbert 1920:43-44.
†*Quaesita fragilis* Jordan and Gilbert: Jordan 1921a:247, pls. 14b, 23b (restoration).

Type Specimen: †***Quaesita fragilis*** Jordan and Gilbert 1920, holotype, CAS 70013 (SU 110), right counterpart. **Dussumieriidae.**

Type Locality: San Pedro Hills, formation and age not stated, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1921a): figured the holotype [pls. 14b, 23b (restoration)], otherwise no new information presented. **Dussumieriidae.**

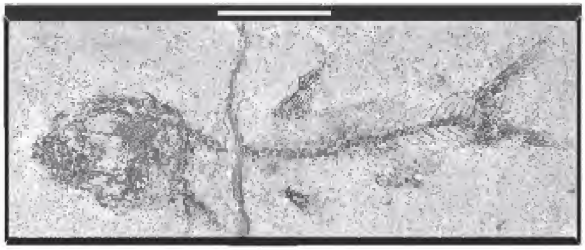


FIGURE 20. †*Quaesita fragilis* Jordan and Gilbert 1920, holotype, CAS 70013 (from color image provided by CAS); scale bar equals 1 cm.

Subfamily **Bathylaginae** genus and species undetermined

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente formation, Late Miocene, Los Angeles County; no specific specimens.

Order **Salmoniformes**

Family **Osmeridae**

Genus ***Spirinchus*** Jordan and Evermann 1896b

Spirinchus starksi (Fisk 1913)

Selected Synonymy and References

Osmerus starksi Fisk 1913:293.
Spirinchus starksi (Fisk): Fitch 1967:9.
Spirinchus starksi (Fisk): Nolf 1985:49.

Type Specimen: Extant, ***Osmerus starksi*** Fisk, holotype, USNM 74834 (Eschmeyer 1998:1602).

Type Locality: San Francisco market, California.

Referred Specimens in Fitch (1967:9): No specific specimens. He states that otoliths of ***S. starksi*** have been found in a marine Pliocene deposit at Santa Barbara, Santa Barbara County, California (see Remarks).

Referred Specimens in Nolf (1985:49): He cites Fitch (1967) that otoliths of ***S. starksi*** have been recorded from the Pliocene of California.

Remarks: Fitch (1967) gave only a general description of the Santa Barabara locality. The LACMIP Locality Register lists two localities (LACMIP 473 and 4684) that list Fitch as the collector. Both localities are considered Pleistocene (Santa Barbara Formation), therefore the presence of ***S. starksi*** in a marine Pliocene deposit at Santa Barbara is questionable.

***Spirinchus* sp.**

***Spirinchus* sp.**: Fitch 1967:9.

Referred Specimens in Fitch (1967:9): No specific specimens. Citing unpublished data, he stated that otoliths of ***Spirinchus* sp.** are abundant in a freshwater Pliocene deposit, Tulare Formation, Kettleman Hills, Kings County, California.

Family **Salmonidae**

Genus ***Oncorhynchus*** Suckley 1861

†***Oncorhynchus rastrosus*** (Cavender and Miller 1972)

Figure 21

Selected Synonymy and References

†***Smilodonichthys rastrosus*** Cavender and Miller 1972.
†***Smilodonichthyes rastrosus*** Cavender and Miller: Barnes et al. 1981:58.
†***Smilodonichthys rastrosus*** Cavender and Miller: Smith 1981:table 2.
†***Smilodonichthys rastrosus*** Cavender and Miller: Behnke 1992:14.
†***Oncorhynchus "Smilodonichthys" rastrosus*** (Cavender and Miller): Stearley and Smith 1993:23.
†***Oncorhynchus (Smilodonichthys) rastrosus*** (Cavender and Miller): Smith et al. 2000:7, 20.
†***Oncorhynchus rastrosus*** (Cavender and Miller): Nelson 2006:202.
†***Oncorhynchus rastrosus*** (Cavender and Miller): Eiting and Smith 2007:412.
†***Oncorhynchus rastrosus*** (Cavender and Miller): Esteve and McLennan 2007:527.

Type Specimen: †***Smilodonichthys rastrosus***, holotype, UO 26799, skull with jaws, and branchial apparatus. **Salmonidae.**

Type Locality: UO locality 2250, Madras Formation, Barstovian, Late Miocene, near Gateway, Jefferson County, Oregon.

Paratype: From type locality: UO F3335, associated fragments from a single individual.

Referred Specimens from Oregon: From type locality: UMMP V58061-V580633.

From Worden, Klamath County, Oregon, ?Yonna Formation, Late Miocene: UMMP V58064.

Referred Specimens from California: From Pinole, Contra Costa County, Late Miocene, UC localities V2572, V3425, V3837; specimens UCMP 22560, 34566, 37584, 58570, 61039, 61550, 61554, 64100, 65629, and 65630.

From Turlock Lake, Stanislaus County, Mehrten Formation, Late Miocene; specimens UCMP 44668, 48657, and 93170-93187.

Referred Specimens in Barnes et al. (1981): From the lower part of the San Mateo Formation, Late Miocene, San Diego County; UCMP locality V68147: UCMP 88703, vertebra; UCMP locality 88651: UCMP 88652, vertebra; 88653, vertebra; 119996, vertebra.

Referred Specimens in Behnke (1992): None, just a mention of the presence of †***S. rastrosus*** in the "Pliocene" of Oregon and California.

Referred Specimens in Stearley and Smith (1993): No specimens are mentioned, but they stated that †***O. "Smilodonichthys" rastrosus*** is known from the Miocene of California and Oregon.

Referred Specimens in Smith et al. (2000): They described several specimens of †***O. (Smilodonichthys) rastrosus*** collected in the Ringold Formation, Late Miocene, south-central Washington and noted that the species is known from the Miocene of coastal California and inland southern Oregon.

Referred Specimens in Eiting and Smith (2007): No specific specimens are mentioned, but the authors referred to a dwarf form of ***O. rastrosus*** in the Chalk Hills Formation, Late Miocene, Owyhee County, Idaho.

Distribution of Neogene †*O. rastrosus* outside of California: As noted above, specimens have been collected in southern Oregon and northeast Washington.

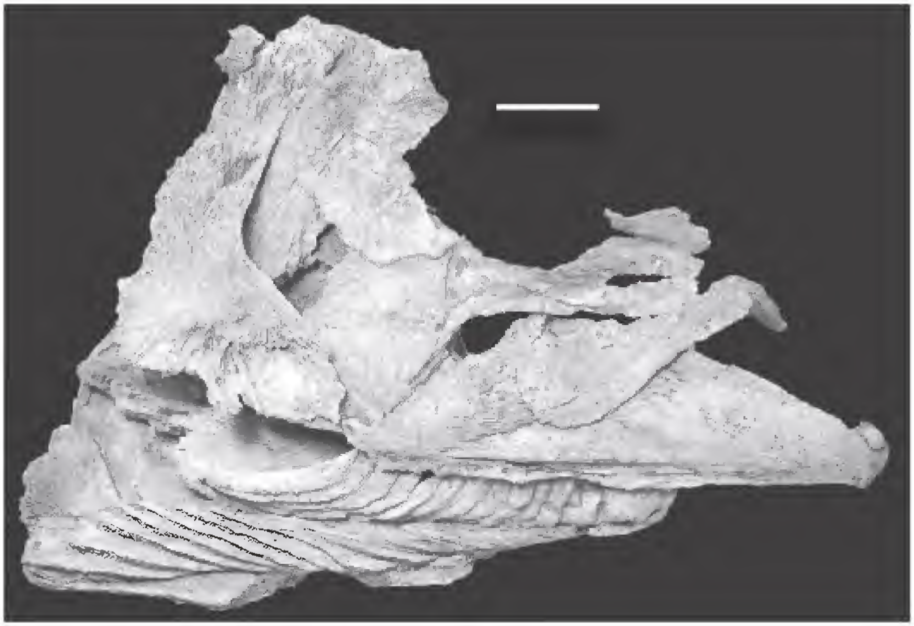


FIGURE 21. †***Oncorhynchus rastrosus*** (Cavender and Miller 1972), holotype, UO 26799 (from photograph by Lieke Dircks, © UO Museum of Natural and Cultural History); scale bar equals 5 cm.

Remarks: There was uncertainty concerning the age of the localities in Cavender and Miller (1972:3-4). They listed the sites as either Barstovian or Hemphillian before the publication of the revised assignment of ages at the Miocene-Pliocene boundary [Berggren and Van Couvering (1974)]. According to Woodburne and Swisher (1995), Barstovian is now considered Middle Miocene and Hemphillian is considered Late Miocene. Eiting and Smith (2007) considered the type locality to be Middle Miocene.

†*Oncorhynchus lacustris* (Cope 1870)

Figure 22

Selected Synonymy & References

†***Rhabdofario lacustris*** Cope 1870:546-547.
†***Salmo copei*** Uyeno and Miller 1963:12.
†***Rhabdofario lacustris*** Cope: Cavender and Miller 1972:40-41.
†***Rhabdofario lacustris*** Cope: Smith 1975:7, figs. 2C, 3.
†***Rhabdofario*** **cf.** ***R. lacustris*** Cope: Taylor and Smith 1981:349, pl. 17, fig. 1.
†***Oncorhynchus lacustris*** (Cope): Smith et al. 2002: 219-220, table 1.

Type Specimen: †***Rhabdofario lacustris*** Cope 1870, holotype, USNM 16352 (Cope listed it as 9790 Smithsonian Collections), partial cranium and jaws.

Type Locality: Castle Creek, Owyhee County, Idaho, Glenns Ferry Formation, Early Pliocene, non-marine.

Referred Specimens in Cope (1870): From Catherine Creek, Glenns Ferry Formation?, Early Pliocene, Owyhee County?, Idaho, non-marine: Smithsonian Collections 9785-9786.

Referred Specimens and Holotype of †*Salmo copei* in Uyeno and Miller (1963): They synonymized the genus ***Rhabdofario*** with ***Salmo*** and applied the new specific name because the name ***lacustris*** was preoccupied in ***Salmo***. Cavender and Miller (1972) returned to the original name because the two genera are distinct. (Smith 1975:7). No mention of specimens of †***R. lacustris*** from California.

Referred Specimens in Cavender and Miller (1972): See above entry. No mention of specimens of †***R. lacustris*** from California.

Referred Specimens in Smith (1975): Redescription of the species with no mention of specimens from California.

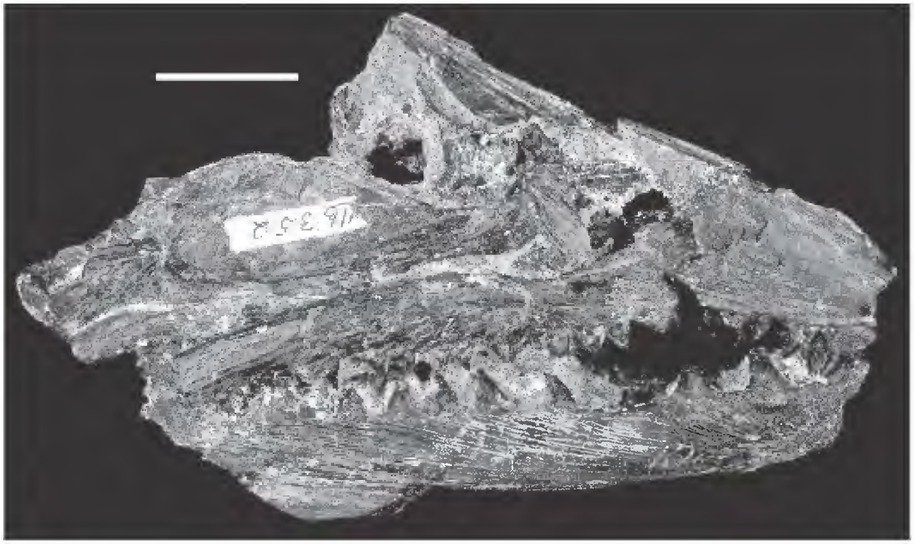


FIGURE 22. †***Oncorhynchus lacustris*** (Cope 1870), holotype, USNM 16352 (from color image, © Smithsonian Institution, all rights reserved); scale bar equals 2 cm.

Referred Specimens in Taylor and Smith (1981): From locality B, Honey Lake, ? upper Alturas Formation, Early Pliocene, Lassen County; UMMP V 74712, right maxilla (plate 17, fig. 1) and three vertebrae.

Referred Specimens in Smith et al. (2002): Compared specimens collected by Taylor and Smith (1981) and Charles Dailey with extant trout, but there was no mention of individual specimens.

Distribution of Neogene †***O. lacustris*** outside of California: Castle Creek, Owyhee County, Idaho.

Remarks: Taylor and Smith (1981) noted that the two ***Oncorhynchus*** maxillae collected by Wagner et al. (1997) [this information was not available in the publication, therefore it is probably from a personal communication] establish a presence of a trout similar to the ***O. clarki-O. mykiss*** series north of Eagle and Honey Lakes during the Pliocene. We were unable to find Cope's referred specimens (Smithsonian Collections 9785-9786) in the USNM collections database.

†***Oncorhynchus*** **sp.**

†***Oncorhynchus*** **sp.**: Wagner et al. (1997)

Referred Specimens in Wagner et al. (1997:15): From UCMP V95030, Signal Butte local fauna, upper Alturas Formation, Early Pliocene, Modoc County; no mention of individual specimens (see Remarks section above).

Referred Specimens in Wagner et al. (1997:17): From Secret Valley local fauna, upper Alturas Formation, Early Pliocene, Lassen County; no mention of individual specimens.

Order **Stomiiformes**

Suborder **Gonostomatoidei**

Family **Gonostomatidae**

Genus ***Cyclothone*** Goode and Bean 1883

†***Cyclothone solitudinis*** (Jordan 1907)

Figure 23

Selected Synonymy & References

†***Rogenio solitudinis*** Jordan 1907:128-130, text-fig. 23.
†***Rogenio solitudinis*** Jordan: Jordan 1919:8, pl. 2, fig. 1.
†***Rogenio solitudinis*** Jordan: Jordan 1921a:253, pl. 17b (restoration).
†***Cyclothone*** **cf.** ***C. solitudinis*** (Jordan): David 1943:59.

Type Specimen: †***Rogenio solitudinis*** Jordan 1907, holotype, CAS 69929 (SU 56), right counterpart (text-fig. 23). Listed as a paratype in the CAS catalog. **Copitopsidae(?)**.

Type Locality: Soledad Pass, age and formation not stated, Los Angeles County.

Referred Specimens in Jordan (1907): None.

Holotype and referred Specimens of †***R. solitudinis*** in Jordan (1919:8, pl. 2, fig. 1): From type locality: holotype (see above); referred specimens, CAS 70011 (SU 57), counterpart; 70009 (SU 81), 16 specimens on one slab; SU 79, whereabouts unknown.

From: Brown's Cañon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; CAS 70008 (SU 87), counterpart. **Rogeniidae**.

Referred Specimens of †***R. solitudinis*** in Jordan [1921a:253, pl. 17b (restoration)]: None.

Referred Specimens of †***R. solitudinis*** and placement of †***Rogenio*** in ***Cyclothone*** in David (1943:59): No referred specimens. She briefly mentioned that the holotype belongs to ***Cyclothone*** and should be classified as †***Cyclothone*** **cf.** ***C. solitudinis*** (Jordan) (see Remarks).

Remarks: We accept David's conclusion that †***Rogenio*** should be included in the synonymy of ***Cyclothone***, however we do not accept her decision to include †***Rogenio solitudinis*** in the synonymy of †***Cyclothone*** **cf.** ***C. solitudinis*** (see next entry).

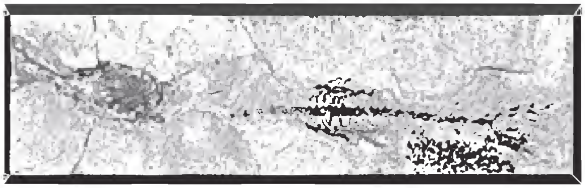


FIGURE 23. †*Cyclothone* ***solitudinis*** (Jordan 1907), holotype, CAS 69929 (from color image provided by CAS); scale bar equals 1 cm.

†*Cyclothone* cf. *C. solitudinis* (Jordan 1907)

Selected Synonymy & References

†***Rogenio solitudinis*** Jordan 1907:128-130, text-fig. 23: David 1943:59.
†***Rogenio vanclevi*** Jordan and Gilbert 1919a:24-25, pl. 31, fig. 3: David 1943:59.
†***Rogenio vanclevi*** Jordan and Gilbert: Jordan 1921a:253-254, pl. 25a (restoration).
†***Cyclothone* cf. *C. solitudinis*** (Jordan 1907): David 1943:59

Referred Specimens in David (1943:59): From LACM (CIT) locality 382, Santa Monica Mountains, lower Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10150, left and right counterparts; 10151, left and right counterparts.

From LACM (CIT) locality 380, Santa Monica Mountains, lower Modelo Formation, Late Miocene, Los Angeles County; 14 slabs (several with more than one specimen), LACM (CIT) 10180-10193, all counterparts with some with both right and left and others uncatalogued. **Gonostomatidae.**

Holotype and Referred specimens of †***R. vanclevi*** Jordan and Gilbert reidentifed as †***Cyclothone* cf. *C. solitudinis*** (Jordan) by David (1943:59): From Bairdstown (= El Sereno neighborhood of east Los Angeles), Monterey Formation, Late Miocene, Los Angeles County; holotype, SU 23, left counterpart, whereabouts unknown.

From Alhambra, formation not stated, Miocene, Los Angeles County; referred specimen in Jordan (1919:8), SU 721, whereabouts unknown.

Remarks: David (1943:59) included both †***R. solitudinis*** Jordan and †***R. vanclevi*** Jordan and Gilbert in †***Cyclothone* cf. *C. solitudinis***, but we believe this is taxonomically improper because she did not recognize †***C. solitudinis*** as a valid species. Thus, we include †***R. vanclevi*** in the synonymy of †***Cyclothone* cf. *C. solitudinis***, but not †***R. solitudinis*** (see above entry).

Cyclothone sp.

Selected References

***Cyclothone* sp.**: David 1943:123.
***Cyclothone* sp.**: Fitch and Lavenberg 1968:27.
***Cyclothone* sp.**: Frickhinger 1995:621.
***Cyclothone* sp.**: Huddleston and Takeuchi 2006:33.

Referred Specimen in David (1943:123): From LACM (CIT) locality 385, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; LACM (CIT) 10195, right counterpart.

Referred Specimens in Fitch and Lavenberg (1968:27): No specific specimens or locality. The authors make the general statement that "*Cyclothone* remains … have been found in many Miocene diatomite and shale deposits in southern California".

Referred Specimens in Frickhinger (1995:621, unnumbered figure): He figured one specimen, a left counterpart, housed in the YPM collection. There was no museum number and the locality was given only as upper Miocene of California.

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens.

Family **Sternoptychidae**

Genus *Argyropelecus* Cocco 1829

†*Argyropelecus bullockii* David 1943

Figure 24

Selected Synonymy & References

†*Argyropelecus bullockii* David 1943:11-13, text-fig. 4.
†*Argyropelecus bullockii* David: David 1943:60, text-fig. 11.
†*Argyropelecus bullockii* David: David 1943:123.
†*Argyropelecus bullockii* David: Carnevale 2003:73.

Type Specimen: †***Argyropelecus bullockii*** David 1943, holotype, LACM (CIT) 10029, almost complete right counterpart. **Sternoptychidae.**

Type Locality: LACM (CIT) locality 317, "Sepulveda Tunnel", Santa Monica Mountains, lower Member, Modelo Formation, Late Miocene, Los Angeles County.

Referred Specimens in David (1943:60, text-fig. 11): From LACM (CIT) locality 382, Dixie Canyon Road and Mulholland Highway, Santa Monica Mountains, lower Member, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10251 (originally designated as specimen 109, Los Angeles High School collection), well-preserved left counterpart.

Referred Specimens in David (1943:123): From LACM (CIT) locality 385, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; LACM (CIT) 10196, one complete counterpart.

Referred Specimens in Carnevale (2003:73): Only refers to the three specimens described and figured in David (1943:11-13, 60, 123).

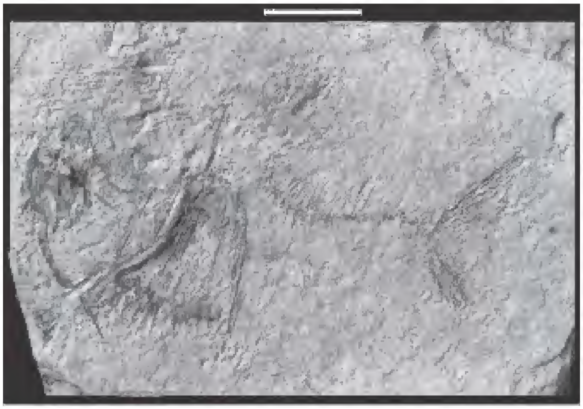


FIGURE 24. †*Argyropelecus bullocki* David 1943, holotype, LACM (CIT) 10029 (from color image provided by LACM); scale bar equals 1 cm.

Argyropelecus affinis Garman 1899

Selected Synonymy & References

Fossils A and B: Baird 1971:23, figs. 12, 13.
Argyropelecus affinis Garman 1899: Carnevale 2003:73.

Type Specimen: Extant, ***Argyropelecus affinis*** Garman 1899, holotype, USNM 44593 (Eschmeyer 1998:46).

Type Locality: Off Antilles (Eschmeyer 1998:46).

Referred Specimens in (Baird 1971): From LACM locality 1925, 'Cabrillo Beach Park', Cabrillo Beach Park, Palos Verdes, Valmonte Diatomite Member, Monterey Formation, Late Miocene, Los Angeles County; two complete, uncatalogued specimens, whereabouts unknown. **Sternoptychidae.**

Referred Specimens in Carnevale (2003): Only refers to the two specimens described and figured by Baird (1971).

***Argyropelecus* sp.**

Selected Synonymy & References

Fossil C: Baird 1971:23, fig. 14.
***Argyropelecus* sp.**: Fitch and Lavenberg 1968:29.
***Argyropelecus* sp.**: Frickhinger 1995:626, unnumbered figure.
***Argyropelecus* sp.**: Carnevale 2003:73.
***Argyropelecus* sp.**: Huddleston and Takeuchi 2006:33, table 1.

Referred Specimens in Baird (1971:23, fig. 14): From an uncatalogued locality, Bluss Cove, Palos Verdes, formation not stted, Middle Miocene, Los Angeles County; one complete, uncatalogued counterpart in the collections of LACM. **Sternoptychidae**.

Referred Spceimens in Fitch and Lavenberg (1968:29): No specific specimen or locality. They state that "fossil skeletons of ***Argyropelecus*** have been found imbedded in Miocene diatomites at several localities in California; some of these may be ***A. pacificus***", an extant species.

Referred Specimens in Frickhinger (1995:626, unnumbered figure): He figured one specimen, a left counterpart, from the YPM collection. There was no museum number and the locality was given only as Miocene of California.

Referred Specimens in Carnevale (2003): Only refers to the one specimen described and figured by Baird (1971).

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Suborder **Phosichthyoidei**

Family **Stomiidae**

Genus ***Chauliodus*** Bloch and Schneider 1801

†***Chauliodus eximius*** (Jordan and Gilbert *in* Jordan 1925)

Figure 25

Selected Synonymy & References

†***Eostomias eximius*** Jordan and Gilbert *in* Jordan 1925:13).
†***Chauliodus barbatus frazeri*** David 1943:61, pl. 9, fig. 5: Crane 1966:16, 22.
†***Chauliodus eximius*** (Jordan and Gilbert): David 1943:123.
†***Chauliodus eximius*** (Jordan and Gilbert): Crane 1966:22, text-fig. 2.
†***Chauliodus eximius*** (Jordan and Gilbert): Fitch and Lavenberg 1968:37.
†***Chauliodus eximius*** (Jordan and Gilbert): Huddleston and Takeuchi 2006:33, table 1.

Type Specimen: †***Eostomias eximius*** Jordan and Gilbert *in* Jordan 1925, holotype, CAS 70086 (SU 688, 192) left counterpart. **Stomiatidae**.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens and Holotype of †***Chauliodus barbatus frazeri*** in David (1943:61): From LACM (CIT) locality 326, Upper Modelo Formation, Late Miocene, Los Angeles County; holotype, LACM (CIT) 10163, left counterpart.

From type locality: LACM (CIT) 80 and 81, right and left counterparts.

From LACM (CIT) locality 381, Upper Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10153, left and right counterpart of head.

From LACM (CIT) locality 382, Upper Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10152, left and right counterparts. **Chauliodontidae**.

Referred Specimens of †***C. eximius*** in David (1943:123): Only the holotype of †***Eostomias eximius*** Jordan and Gilbert**.** **Chauliodontidae**.

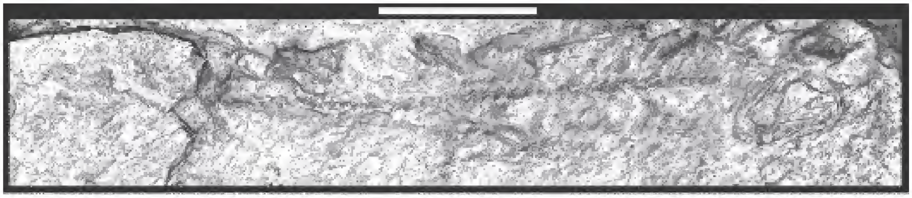


FIGURE 25. †*Chauliodus eximius* (Jordan and Gilbert *in* Jordan 1925), holotype, CAS 70086 (from color image provided by CAS); scale bar equals 3 cm.

Referred Specimens of †*C. eximius* in Crane (1966): The following were designated as Plesiotypes and all localities are in the Upper Modelo Formation, Late Miocene, Los Angeles County:

From LACM locality 1267: LACM 5253, left and right counterparts; 11048, left and right counterparts; 11439, counterpart; 11440, counterpart.

From LACM locality 1806: LACM 5242, counterpart.

From LACM (CIT) locality 326: LACM 10163, left counterpart.

Crane (1966) listed the following as referred specimens: From LACM (CIT) locality 332, Sulfur Canyon, Modelo Formation, Late Miocene, Ventura County; LACM 11228, left counterpart.

From LACM (CIT) locality 385, Salsipuedes Creek, Monterey Formation, County not stated: specimen numbers not stated.

From LACM locality 1035, Upper Modelo Formation, Late Miocene, Los Angles County; LACM 12410, left and right counterparts.

From LACM locality 1267, Upper Modelo Formation, Late Miocene, Los Angeles County; LACM 5244, left and right counterparts; 5245, counterpart; 5246 left and right counterparts; 5247, counterpart; 5248, counterpart; 5249, counterpart; 5250, counterpart, 5251, left and right counterparts; 5252, counterpart; 5253, left and right counterparts; 5254, counterpart, 5255, counterpart; 5256, left and right counterparts; 5257, left and right counterparts; 5258, left and right counterparts; 5259, counterpart; 5260, counterpart; 5261, counterpart; 11047, right counterpart; 11239, partial left and right counterparts; 11240, partial left and right counterparts; 11241, partial right counterpart; 11441, partial counterpart.

From LACM locality 1806, Upper Modelo Formation, Late Miocene. Los Angeles County; LACM 5243, counterpart.

From LACM locality 1925, Modelo Formation, Late Miocene, Cabrillo Beach, San Pedro, Los Angeles County; LACM 11038, left and right counterparts; 11039, left and right counterparts; 11040, right counterpart; 11041, right counterpart; 11042, partial right and left counterparts; 11043, right counterpart.

From LACM locality 6589, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; specimens LACM 11044, left and right counterparts; 12239, counterpart.

From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; LACM 17143 (this specimen was mentioned in the Addendum of Crane 1966). **Chauliodontidae**.

Referred Specimens in Fitch and Lavenberg (1968:37): No specific specimens or localities mentioned. They state "fossil remains of *Chauliodus* (entire skeletal imprints) are not uncommon in several Miocene diatomite and shale deposits in southern California. These represent an extinct species, *C. eximius*."

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Remarks: Crane (1966) believed that the holotype of †*Eostomias eximius* Jordan and Gilbert (1925b) was lost, and designated specimen LACM 11044, right and left counterparts, as a neotype. The neotype locality was LACM 6589, Lompoc, Monterey Formation, latest Miocene, Santa Barbara County. Later the holotype was found. Based on an application by Lavenberg (1971), the International Commission of Zoological Nomenclature (1974) noted in opinion number 1031 that since the type specimen of †*Eostomias eximius*

Jordan and Gilbert (1925b), had been rediscovered, the neotype designation was unnecessary. As noted in the preface, we follow the classification of Nelson (2006) who recognizes the family name **Stomiidae** rather than **Chauliodontidae**.

Order **Aulopiformes**

Family **Paralepididae**

Genus †***Drimys*** Jordan 1925
†***Drimys defensor*** Jordan 1925

Selected Synonymy & References

†***Lygisma tenax*** Jordan and Gilbert 1919a [in part]: Jordan and Gilbert 1920:12.
†***Drimys defensor*** Jordan1925:14, pl. 4b.

Type Specimen: †***Drimys defensor*** Jordan1925, holotype, SU 79, left counterpart (pl. 4b), whereabouts unknown. Originally described as †***L. tenax*** by Jordan and Gilbert (1920:12). **Paralepidae**.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Remarks: The family name **Paralepididae** is considered a more correct spelling than **Paralepidae**.

Order **Myctophiformes**

Family **Myctophidae**
Subfamily **Myctophinae**

Genus ***Benthosema*** Goode and Bean 1896
***Benthosema* sp.**: Fitch 1969b:3, 6, table 1.

Referred Specimens in Fitch (1969b:3, 6, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 11 otoliths (unfigured).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; two otoliths (unfigured).

Remarks: Fitch (1969b:3, table 1, fig. 1B) also reported otoliths of ***Benthosema* sp.** from LACMIP locality 435 (Lomita Marl), but this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Genus ***Electrona*** Goode and Bean 1896
Electrona rissoi (Cocco, 1829)

Selected References (fossils only)

Electrona rissoi (Cocco 1829:144): Fitch and Reimer 1967:79, 81, 84, table 1, fig. 11.
Electrona rissoi (Cocco): Fitch 1968:8.
Electrona rissoi (Cocco, 1829): Fitch 1969b:3, 5-7, table 1.

Type Specimen: Extant, ***Scopelus risso*** Cocco 1829:144, no type known (Eschmeyer 1998:1455).

Type Locality: Messina, Italy.

Referred Specimens in Fitch and Reimer (1967:79, 81, 84, table 1, fig. 11): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; two otoliths (one as fig. 11).

Referred Specimens in Fitch (1968:8): No specific specimens or locality. He notes that otoliths of ***E. rissoi*** have been found in small numbers in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1969b: 3, 5-7, table 1): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; two otoliths (unfigured).

From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; seven otoliths (unfigured).

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***E. rissoi*** from this locality is questionable.

Genus ***Hygophum*** Bolin 1939

***Hygophum* sp.**: Fitch 1969b:11, 13, table 2, fig. 2g

Referred Specimens in Fitch (1969b:11, 13, table 2, fig. 2g): From Round Mountain Silt, Middle Miocene, Kern County; one otolith (fig. 2g).

***Myctophum* sp.**: Fitch 1969b:11, 13, table 2, fig. 2h

Referred Specimens in Fitch (1969b:11, 13, table 2, fig. 2h): From Round Mountain Silt, Middle Miocene, Kern County; one otolith (fig. 2h).

Genus ***Symbolophorus*** Bolin and Wisner *in* Bolin 1959

Symbolophorus californiensis (Eigenmann and Eigenmann 1889)

Selected References (fossils only)

Symbolophorus californiensis (Eigenmann and Eigenmann 1889:124): Fitch 1969b:3, 6, 9-10, table 1, fig. 1a.

Type Specimen: Extant, ***Myctophum californiense*** Eignemann and Eigenmann 1889, BMNH 1891.5.17.4 (one of several syntypes, some at other intstitutions) (Eschmeyer 1998:309).

Type Locality: Cortex Banks, off San Diego, California.

Referred Specimens in Fitch (1969b:3, 6, 9-10, table 1): From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; one otolith (unfigured).

From LACMIP locality 305 (= LACM locality 44213), San Diego, San Diego Formation, Late Pliocene, San Diego County; 13 otoliths (unfigured).

Remarks: Fitch (1969b) reported otoliths of ***S. californiense*** from LACMIP locality 435 (Lomita Marl, Pliocene), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

***Symbolophorus* sp.**

Referred Specimens in Fitch and Lavenberg (1968:44): They state “fossil lanternfish ‘imprints’ (skeletal remains) are abundant in Miocene diatomite and shale deposits throughout most of southern California, and myctophid otoliths, including those of ***Symbolophorus***, have been found in a dozen or more Pleistocene, Pliocene, and Miocene deposits.”

Genus ***Tarletonbeania*** Eigenmann and Eigenmann 1890

Tarletonbeania crenularis (Jordan and Gilbert 1880a)

Selected References (fossils only)

Tarletonbeania crenularis (Jordan and Gilbert 1880a:274): Fitch 1968:10.

Tarletonbeania crenularis (Jordan and Gilbert): Fitch 1969b:3, 6, 10, table 1, fig. 1e.

Tarletonbeania crenularis (Jordan and Gilbert): Nolf 1985:57.

Type Specimen: Extant, ***Myctophum crenulare*** Jordan and Gilbert 1880a, holotype, USNM 27402 (Eschmeyer 1998:425).

Type Locality: Santa Barbara Channel, California.

Referred Specimens in Fitch (1968:10): No specific specimens. He notes that otoliths of ***T. crenularis*** have been found in several southern California Pliocene and Pleistocene deposits with more than 300 having been recovered from the Lomita Marl (see next entry).

Referred Specimens in Fitch (1969b:3, 6, 10, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 11 otoliths (unfigured).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; seven otoliths (unfigured).

Referred Specimens in Nolf (1985:57): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Remarks: Fitch (1969b) also reported otoliths of ***T. crenularis*** from LACMIP locality 435 (Lomita Marl, Pliocene), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Subfamily **Lampanyctinae**

Genus ***Ceratoscopelus*** Günther 1864

Ceratoscopelus townsendi Eigenmann and Eigenmann 1889

Selected References (fossils only)

Ceratoscopelus townsendi Eigenmann and Eigenmann: Fitch 1968:7.
Ceratoscopelus townsendi Eigenmann and Eigenmann: Fitch 1969b:3, 5, 6, table 1, fig. 1o.

Type Specimen: Extant, ***Ceratoscopelus townsendi*** Eigenmann and Eigenmann 1889, syntypes, BMNH 1891.5.19.172-173 plus others (Eschmeyer 1998:1687).

Type Locality: Cortex Banks, off San Diego, California.

Referred Specimens in Fitch (1968:7): No specific specimens. He notes that otoliths of ***C. townsendi*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1969b:3, 5, 6, table 1, fig. 1o): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 296 otoliths (one as fig. 1o).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 12 otoliths (unfigured).

From LACMIP locality 305 (= LACM locality 4213), San Diego, San Diego Formation, Late Pliocene, San Diego County; seven otoliths (unfigured).

Remarks: Fitch (1969b) also reported otoliths of ***C. townsendi*** from LACMIP locality 435 (Lomita Marl, Pliocene), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Genus ***Diaphus*** Eigenmann and Eigenmann 1890

†***Diaphus bolini*** (David 1943)

Selected Synonymy & References

†***Lampanyctus bolini*** David 1943:64-68; text-figs. 13a-d, pls. 7 (fig. 2), 9 (figs. 1, 2).
†***Lampanyctus bolini*** David: Pierce 1956:1310, pl. 144, figs. 6, 7.
†***Diaphus bolini*** (David): Fitch 1969b:14-15.
†***Lampanyctus bolini*** David: Prokofiev 2002:673.

Type Specimen: †***Lampanyctus bolini*** David 1943, holotype, LACM (CIT) 10026 (pl. 7, fig. 2), two specimens in counterparts, one lying above the other, the lower specimen was designated as the holotype.

Type Locality: LACM (CIT) locality 326, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Paratypes (= Cotypes): From type locality: 80 specimens, LACM (CIT) 10011, left and right counterpats; 10012, left and right counterparts; 10013, left and right counterparts; 10018, left and right counterparts; 10019, left and right counterparts; 10020, left and right counterparts; 10021, left and right counterparts; 10022, left and right counterparts; 10023, left and right counterparts; 10024, counterpart; 10025, counterpart; 10026, left and right counterparts; 10027, left and right counterparts; 10044 (text-fig. 13c, pl. 9, fig. 1) , left and right counterparts; 10045, left and right counterparts; 10046, left and right counterparts; 10047 (text-fig. 13a, pl. 9, fig. 2), 10048, left and right counterparts; 10049, left and right counterparts; 10064, left and right counterparts; 10096, left counterpart; 10104, left and right counterparts; 10105, left counterpart; 10106, left counterpart; 10107, left counterpart; 10108, left counterpart; 10109, left counterpart; 10110, left and right counterparts; 10111, left and right counterparts; 10118, left and right counterparts; 10119, right counterpart; 10120 (text-fig. 13d), right counterpart; plus numerous uncatalogued specimens.

From LACM locality 1039, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; 10 specimens, LACM 1187, counterpart; 1188, partial counterpart; 1191, caudal vertebral column; 1194, counterpart; 1197, rib; 1199, partial counterpart; 1200, counterpart; 1201, counterpart; 1202, counterpart; 1205, counterpart.

Referred Specimens in David (1943): From type locality LACM (CIT) 326 or nearby: 25 specimens, numbers 42-62 and 84 of the R. W. Frazier Collection, whereabouts unknown; LACM (CIT) 10165, left and right counterparts.

From LACM (CIT) locality 380, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; a number of uncatalogued fragments.

Referred Specimens in Pierce (1956:1310, pl. 144, figs. 6, 7): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; right counterpart (p. 144; fig. 6), whereabouts unknown; scale, USC 3639 (pl. 144, fig. 7), whereabouts unknown.

Referred Specimens in Fitch (1969b:14-15): Examined only the type material (presumably both the holotype and paratypes).

Referred Specimens in Prokofiev (2002:673): He noted that placement of †***L. bolini*** in the genus ***Lampanyctus*** is provisional and thinks this species belongs to the subfamily **Myctophinae** in contrast to the decision by Fitch (1969b) who placed it in ***Diaphus***, a genus in the subfamily **Lampanyctinae**.

Remarks: According to Fitch (1969b:14-15), none of David's paratypes of †***L. bolini*** belong to the same genus as the holotype (***Diaphus***).

Diaphus theta Eigenmann and Eigenmann 1890

Selected References (fossils only)

Diaphus theta Eigenmann and Eigenmann 1890:4.
Diaphus theta Eigenmann and Eigenmann: Fitch 1968:8.
Diaphus theta Eigenmann and Eigenmann: Fitch 1969b:3, 5, 6, table 1, fig. 1n.

Type Specimen: Extant, ***Diaphus theta*** Eigenmann and Eigenmann 1890, lectotype, USNM 41914 (Eschmeyer 1998:1672).

Type Locality: Off Point Loma, California.

Referred Specimens in Fitch (1968:8): No specific specimens. He notes that otoliths of ***D. theta*** have been found in several southern California Pliocene and Pleistocene deposits with more than 400 having been recovered from the Lomita Marl (see next entry).

Referred Specimens in Fitch (1969b:3, 5, 6, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 247 otoliths (unfigured).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 54 otoliths (unfigured).

From LACMIP locality 305 (= LACM locality 44213), San Diego, San Diego Formation, Late Pliocene, San Diego County; 13 otoliths (unfigured).

Remarks: Fitch (1969b) also reported otoliths of ***D. theta*** from LACMIP locality 435 (Lomita Marl, Pliocene), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

***Diaphus* sp.**: Fitch 1969b:11, 13, table 2, figs. 2a, b

Referred Specimens in Fitch (1969b): From: Round Mountain Silt, Middle Miocene, Kern County; one otolith (fig. 2a)

From LACM locality 4286, California State Highway 178, Round Mountain Silt, Middle Miocene, Kern County; 261 otoliths (one figured as fig. 2b).

Genus ***Lampadena*** Goode and Bean *in* Gill 1893

Lampadena urophaos Paxton 1963

Selected References (fossils only)

Lampadena urophaos Paxton 1963:29.
Lampadena urophaos Paxton: Fitch 1968:8.
Lampadena urophaos Paxton: Fitch 1969b:3, 6-7, table 1, fig. 1c.
Lampadena urophaos Paxton: Nolf 1985:56.

Type Specimen: Extant, ***Lampadena urophaos*** Paxton 1963:29, holotype, LACM 6843-6 (Eschmeyer 1998:1730-1731).

Type Locality: 5.7 mi. north of Ship Rock, Santa Catalina Island, California.

Referred Specimens in Fitch (1968:8): No specific specimens. He notes that otoliths of ***L. urophaos*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Nolf (1985:56): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Remarks: Fitch (1969b:3, 6-7, table 1, fig. 1c) reported otoliths of ***L. urophaos*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County) and because this locality is now considered Pleistocene (Blake 1991; Dibblee 1999) and no other specific locality is known, then the presence of ***L. urophaos*** in the Neogene is questionable.

Genus ***Lampanyctus*** Bonaparte 1840

†***Lampanyctus petrolifer*** (David 1943)

Selected Synonymy & References

†***Lampanyctus petrolifer*** David 1943:62-64; text-figs. 2a, b, pl. 8, figs. 1-3.
†***Lepidophanes petrolifer*** (David): Fitch 1969b:14-15.
†***Lampanyctus petrolifer*** David: Prokofiev 2002:671-674; unnumbered fig.

Type Specimen: †***Lampanyctus petrolifer*** David 1943, holotype, LACM (CIT) 10166 (text-fig. 2b), right and left (pl. 8, fig. 2) counterparts.

Type Locality: LACM (CIT) locality 326, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Paratypes (= Cotypes): From type locality: 27 specimens, numbers 19-39, 40 (text-fig. 12a), 41, 65-66, and 82-83 from R.W. Frazier Collection, whereabouts unknown; LACM (CIT) 10167, left and right counterparts; 10168, right counterpart.

Referred Specimens in David (1943): From LACM (CIT) locality 329, Santa Monica Mountains, Modelo Formation Late Miocene, Los Angeles County; one uncatalogued specimen.

From LACM (CIT) locality 326B, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; several uncatalogued specimens.

From type locality: LACM (CIT) 10097 (pl. 8, fig. 1), right counterpart; 10098, right counterpart.

Referred Specimens in Fitch (1969b:14-15): Examined only the type material (presumably both the holotype and paratypes).

Referred Specimens in Prokofiev (2002): he noted that †*L.* ***petrolifer*** is no doubt a member of the **Lampanyctinae**, but it possibly belongs to an undescribed genus.

Lampanyctus regalis (Gilbert 1892)

Selected References (fossils only)

Lampanyctus regalis (Gilbert 1892:544): Fitch 1969b:3, 6-7, table 1, fig. 1h.
Lampanyctus regalis (Gilbert): Nolf 1985:56.

Type Specimen: Extant, ***Myctophum regale*** Gilbert 1892:544, holotype, USNM 44289 (Eschmeyer 1998:1433).

Type Locality: Santa Barbara Channel, California.

Referred Specimens in Fitch (1969b:3, 6-7, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; two otoliths (unfigured).

Referred Specimens in Nolf (1985:56): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Remarks: Fitch (1969b) also reported otoliths of *L.* ***regalis*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

†***Lampanyctus remifer*** (Jordan and Gilbert *in* Jordan 1925)

Figure 26

Selected Synonymy & References

†***Engraulites remifer*** Jordan and Gilbert ***in*** Jordan 1925:12-13, pl. 3, fig. b.
†***Lampanyctus remifer*** (Jordan and Gilbert): David 1943:95-96, 124.
?†***Lampanyctus remifer*** (Jordan and Gilbert): Grande and Nelson 1985:9-10, fig. 9.

Type Specimen: †***Engraulites remifer*** Jordan and Gilbert ***in*** Jordan 1925, holotype, CAS 61358 (SU 97, 651), left counterpart (plate 3, fig. b). See Remarks section. **Engraulidae**.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimen in Jordan and Gilbert (1925): None.

Referred Specimens and Holotype of †***Engraulites remifer*** (Jordan and Gilbert) reidentified as †***Lampanyctus remifer*** in David (1943:95-96, 124): On pages 95-96 she notes that the holotype is not an engraulid and should be reassigned to ***Lampanyctus***. On page 124 she lists the holotype and two specimens (whereabouts unknown) from the type locality, SU 98 (89) and SBNHM 163, and notes that not enough material of this species is present to permit a specific description. See Remarks section. **Myctophidae**.

Holotype of †***Engraulites remifer*** Jordan and Gilbert in Grande and Nelson (1985): The authors agree with David that the holotype is not an engraulid. In the legend of their figure 2, they state that they "don't necessarily consider the species to be in the Myctophidae", hence we added a question mark (?) before their listing of *L.* ***remifer*** in the Selected Synonymy above.

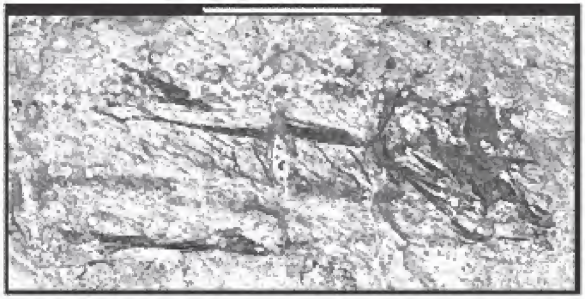


FIGURE 26. †***Lampanyctus remifer*** (Jordan and Gilbert *in* Jordan 1925), holotype, CAS 61358 (from color image provided by CAS); scale bar equals 1 cm.

Remarks: The specimen identified as the holotype of †***E. remifer*** in the CAS collection is labeled CAS 61358 (98, 651). Jordan and Gilbert (1925a) numbered their type specimen as SU 651. David (1943) mixed the specimen numbers by labeling the holotype as SU 97 (651) and her referred specimen as SU 98 (89).

Lampanyctus ritteri Gilbert 1915

Selected References (fossils only)

Lampanyctus ritteri Gilbert 1915:318.
Lampanyctus ritteri Gilbert: Fitch 1969b:3, 6-7;table 1, fig. 1j.
Lampanyctus ritteri Gilbert: Nolf 1985:56.

Type Specimen: Extant, ***Lampanyctus ritteri*** Gilbert 1915:318, holotype, USNM 75807 (Eschmeyer 1998: 1455).

Type Locality: Monterey Bay, California.

Referred Specimens in Fitch (1969b:3, 6-7, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; four otoliths (unfigured).

Referred Specimens in Nolf (1985:56): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Remarks: Fitch (1969b) also reported otoliths of ***L. ritteri*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Lampanyctus **sp.**

Selected Synonymy & References (fossils only)

Lampanyctus **sp.**: David 1943:13.
Lampanyctus **sp.**: Fitch 1969b:11, 13, table 2, figs. 2d, e.
Lampanyctus **sp.**: Frickhinger 1995:660.
Lampanyctus **sp.**: Huddleston and Takeuchi 2006:33, table 1.

Referred Specimens in David (1943:13): From LACM (CIT) locality 320, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10054, counterpart; 10055, counterpart.

From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10122, left counterpart.

From LACM (CIT) locality 334B, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10160, left counterpart (see Remarks).

Referred Specimens in Fitch (1969b:11, 13,, table 2, figs. 2d, e): From California State Highway 178, Round Mountain Silt, Middle Miocene, Kern County; 353 otoliths (one figured as fig. 2e).

From Barker's Ranch, Olcese Sand, early Middle Miocene, Kern County; 15 otoliths (one as fig. 2d).

From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; >100 otoliths and several skeletal imprints with otoliths (unfigured).

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Referred Specimens in Frickhinger (1995:660, unnumbered figure): He figured one specimen, a right counterpart, housed in the AMNH. There was no museum number and the locality was given only as Miocene of California.

Remarks: LACM (CIT) 10160 is listed as ***Cyclothone*** in the LACM database.

Genus ***Notoscopelus*** Günther 1864

Notoscopelus resplendens (Richardson 1845)

Selected References (fossils only)

Lampanyctus resplendens Richardson 1845:42; plate 27 (figs. 16-18).
Notoscopelus resplendens (Richardson): Fitch 1969b:3, 6, 8, table 1, fig. 1m.

Type Specimen: Extant, ***Lampanyctus resplendens*** Richardson 1845, six syntypes, BMNH 1848.3.16 (Eschmeyer 1998:1439).

Type Locality: ?Gulf of Guinea, West Africa.

Referred Specimens in Fitch (1969b:3, 6, 8, table 1, fig. 1m: From LACMIP locality 305 (= LACM locality 4213), San Diego, San Diego Formation, Late Pliocene, San Diego County; two otoliths (one as fig. 1m).

Remarks: Fitch (1969b:3, 6, 8, table 1) also reported otoliths of ***N. resplendens*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

***Notoscopelus* sp.**: Fitch 1969b:11, table 2, fig. 2f

Referred Specimens in Fitch (1969b:11, table 2, fig. 2f): From California State Highway 178, Round Mountain Silt, Middle Miocene, Kern County; 57 otoliths (one as fig. 2f).

Genus ***Stenobrachius*** Eigenmann and Eigenmann 1890

Stenobrachius leucopsarus (Eigenmann and Eigenmann 1890)

Selected References (fossils only)

Stenobrachius leucopsarus (Eigenmann and Eigenmann 1890:5): Fitch 1967:10, 19.
Stenobrachius leucopsarus (Eigenmann and Eigenmann): Fitch 1968:9.
Stenobrachius leucopsarus (Eigenmann and Eigenmann): Fitch 1969b:3, 6, 9, table 1, fig. 1f.
Stenobrachius leucopsarus (Eigenmann and Eigenmann): Zinsmeister 1970:124, table 1.
Stenobrachius leucopsarus (Eigenmann and Eigenmann): Nolf 1985:57.

Type Specimen: Extant, ***Myctophum leucopsarum*** Eigenmann and Eigenmann 1890, lectotype, USNM 41916 (Eschmeyer 1998:900).

Type Locality: Off Point Loma, California.

Referred Specimens in Fitch (1967:19): he notes that otoliths of ***S. leucopsarus*** were found in five of eight marine Pliocene and Pleistocene deposits in Southern California, especially in LACMIP locality 435, Miraleste Canyon, San Pedro, Lomita Marl, Late Pliocene, Los Angeles County. No specific specimens were mentioned. (see Remarks).

Referred Specimens in Fitch (1968:8): No specific specimens. He notes that otoliths of ***S. leucopsarus*** have been found in many southern California Pliocene and Pleistocene deposits, with more than 1,000 having been recovered from a deposit in San Pedro (see next entry).

Referred Specimens in Fitch (1969b:3, 6, 9, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 606 otoliths (unfigured).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 44 otoliths (unfigured).

From LACMIP locality 305 (= LACM locality 44213), San Diego, San Diego Formation, Late Pliocene, San Diego County; one otolith (unfigured).

Referred Specimens in Nolf (1985:57): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County;

none, the species was listed among other macrofossils from the Late Pliocene of Newport Beach, California.

Remarks: Fitch (1967; 1969b:3, 6, 9, table 1, fig. 1f) reported otoliths of ***S. leucopsarus*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Genus ***Triphoturus*** Fraser-Brunner 1949

Triphoturus mexicanus (Gilbert 1890)

Selected References (fossils only)

Triphoturus mexicanus (Gilbert 1890): Fitch 1969b:3, 6, 10-11, table 1, fig. 1g.
Triphoturus mexicanus (Gilbert): Nolf 1985:57.

Type Specimen: Extant, ***Myctophum mexicanum*** Gilbert 1890, lectotype, USNM 76343 (Eschmeyer 1998:1074).

Type Locality: Off Baja California, Mexico.

Referred Specimens in Fitch (1969b:3, 6, 10-11, table 1): From LACMIP locality 471 (= locality LACM 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Late Pliocene, Orange County; two otoliths (unfigured). (see Remarks).

Referred Specimens in Nolf (1985:57): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Remarks: Fitch (1969b:3, 6, 10-11, table 1, fig. 1g) also reported otoliths of ***T. mexicanus*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Myctophidae** genus and species undetermined

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Subfamily **Lampanyctinae** genus and species undetermined

Referred Specimen in Prokofiev (2002:671; unnumbered fig.): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; PIN 697-881, right counterpart.

Order **Lampriformes**

Family **Lampridae**

Genus ***Lampris*** Retzius 1799

Selected Synonomy & References (fossils only)

†***Diatomoeca*** Jordan and Gilbert 1919a.
†***Dasceles*** Jordan 1925.

†***Lampris*** (***Diatomoeca***) ***zatima*** (Jordan and Gilbert 1919a)

Figure 27

Selected Synonymy & References

†***Diatomoeca zatima*** Jordan and Gilbert 1919a:58, pl. 24, fig. 3).
†***Diatomoeca zatima*** Jordan and Gilbert: Jordan and Gilbert 1920:40, pl. 19.
†***Lampris zatima*** (Jordan and Gilbert): Jordan 1920a:370, fig. 3.
†***Diatomoeca zatima*** Jordan and Gilbert: Jordan 1921a:265, pls. 4b, 32 (restoration).

†***Dasceles dassurus*** Jordan 1925:34, pl. 18: David 1943:128.
†***Diatomoeca zatima*** Jordan and Gilbert: Jordan 1927a:6.
†***Lampris* (*Diatomoeca*) *zatima*** (Jordan and Gilbert): David 1943:128, pl. 15, fig. 2.
†***Lampris* (*Diatomoeca*) *zatima*** (Jordan and Gilbert): Fitch and Lavenberg 1968:86.

Type Specimen: †***Diatomoeca zatima*** Jordan and Gilbert 1919a, holotype, CAS 55496 (SU 146, 133), partial right counterpart. According to David (1943:129), CAS 55603 (SU 215, 336) is the left counterpart of the holotype. Original description placed †***D. zatima*** in the **Pleuronectidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None

Referred Specimens of †*D. zatima* in Jordan and Gilbert (1920): None.

Referred Specimens of †*L. zatima* in Jordan (1920a): Although no museum number is given, figure 3 is a photograph of SU 600 described and figured in Jordan (1921). The figure in Jordan (1921) was printed upside down. Specimen is from Lompoc.

Referred Specimens of †*D. zatima* in Jordan (1921a): All from Lompoc and whereabouts unknown: SU 600, left counterpart; SU 62A and 62B, left and right counterparts; SU 57, posterior counterpart.

Holotype of †*Dasceles dassurus* Jordan (1925): From Lompoc: holotype, CAS 55609 (SU 703, 217), a headless right counterpart. **Embiotocidae.**

Referred Specimens of †*D. zatima* in Jordan (1927a): Briefly mentions three specimens whereabouts unknown, SU 452, 453, and 454. **Lampridae.**

Referred Specimens and Holotype of †*L. zatima* and Referred Specimens and Holotype of †*D. dassurus* in David (1943): From Lompoc: holotype, †*L. zatima*: CAS 55496 (SU 146, 133) and CAS 55603 (SU 215, 336), right and left counterparts; †***D. dassurus***: holotype, CAS 55609 (217, 703), partial right counterpart; nine specimens whereabouts unknown, SU 147, 148, 149, 150, 151 (600), 213, 214, 216 (452).

From LACM locality 5839, El Capitan Beach, Monterey Formation, Late Miocene, Santa Barbara County; LACM 130005 (= USC 210), left counterpart (pl. 15).

Referred Specimens of †*L. zatima* in Fitch and Lavenberg (1968:86: The authors note that a Miocene fossil opah, †***L. zatima***, was found in Santa Barbara County.

Remarks: Jordan (1920a, b) placed †***Diatomoeca*** in the synonomy of ***Lampris***, however, Jordan (1927a) referred to †***L. zatima*** as †***Diatomoeca zatima***. In their study of pleuroneciform fishes, Chanet and Schultz (1994:102) noted that †***D. zatima*** is too incomplete for comparison with the new species they were describing from the Miocene of Austria.

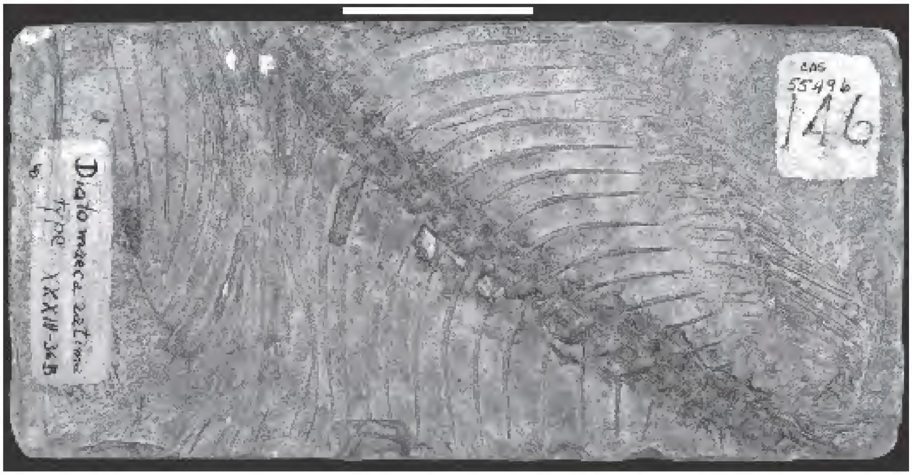


FIGURE 27. †***Lampris zatima*** (Jordan and Gilbert 1919a), holotype, CAS 55496 (from color image provided by CAS); scale bar equals 5 cm.

Order **Gadiformes**

Family **Moridae**

Genus ***Physiculus*** Kaup 1858

Physiculus rastrelliger Gilbert 1890

Synonymy & References (fossils only)

Physiculus rastrelliger Gilbert 1890:113.
Physiculus rastrelliger Gilbert: Fitch 1969a:72, 75, table 1.
Physiculus rastrelliger Gilbert: Zinsmeister 1970:124, table 1.
Physiculus rastrelliger Gilbert: Fitch and Barker 1972:577-578.

Type Specimen: Extant, ***Physiculus rastrelliger*** Gilbert, 29 syntypes, BMNH 1900.9.29.248 (1); SU 185 (13); USNM 44281 (1), 48266 (7), 57877 (2), 144974 (5) [Eschmeyer (1998:1429)].

Type Locality: Off Baja California, Mexico.

Referred Specimens in Fitch (1969a): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 1,387 otoliths (sagittae) (unfigured).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 33 otoliths (sagittae) (unfigured).

Referred Specimens in Zinsmeister (1970): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Fitch and Barker (1972): Repeats the discoveries listed in Fitch (1969a) and mentioned the otoliths reported by Zinsmeister (1970). In addition Fitch mentioned that he found otoliths in another Southern California Pliocene deposit at San Diego [(LACMIP locality 305 (= LACM locality 4213), San Diego, San Diego Formation, Late Pliocene, San Diego County]. He also noted he found otoliths at two Pleistocene deposits: LACMIP locality 473 (= LACM locality 389, 3784), Rincon Hill Road Upper Site, Santa Barbara Formation, Pleistocene, Santa Barbara County and Newport Beach (Jamboree Blvd.). He also mentioned that Barker (unpubl. data) found an unspecified number of otoliths of ***Physiculus*** at Centerville Beach, Pliocene, near Humboldt Bay, Humboldt County.

Remarks: Fitch (1969a) also reported otoliths of ***P. rastrelliger*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Moridae** genus and species undetermined

Referred Specimens in Fitch and Lavenberg (1968:72): They state “fossil otoliths of morids are abundant in Pleistocene, Pliocene, and Miocene deposits throughout southern California, and morid skeletal ‘imprints’ are commonly encountered in Miocene diatomites and shales.”

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Family **Macrouridae**

Genus †*Bolbocara* Jordan 1927a

†*Bolbocara gyrinus* Jordan 1927a

Figure 28

Selected Synonymy & References

†***Bolbocara gyrinus*** Jordan 1927a:10, pl 2B.
†***Bolbocara gyrinus*** Jordan: David 1943:128.
†***Bolbocara gyrinus*** Jordan: David 1956:58, tables 2, 3.

Type Specimen: †***Bolbocara gyrinus*** Jordan 1927a, holotype, CAS 55662 (SU 468, 38), partial right counterpart. **Macrouridae.**
Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.
Referred Specimens: None.
Referred Specimens in David (1943): None.
Referred Specimens in David (1956): Refers only to the holotype, no description. Macruridae.

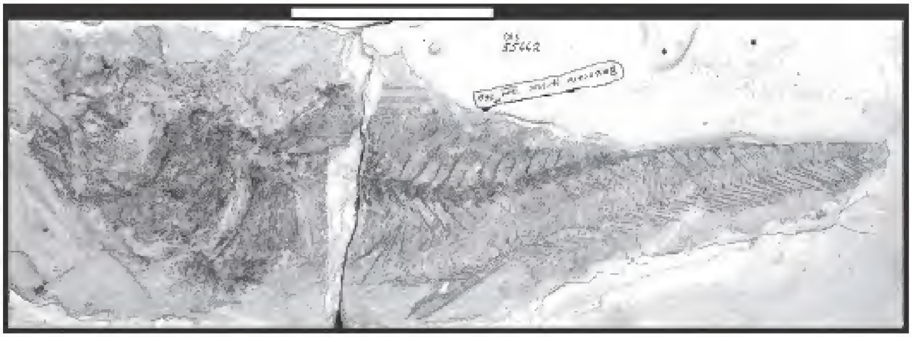


FIGURE 28. †*Bolbocara gyrinus* Jordan 1927a, holotype, CAS 55662 (from color image provided by CAS); scale bar equals 10 cm.

Genus †*Amblygoniolepidus* David 1956

†*Amblygoniolepidus polystichus* David 1956

Figure 29

Selected Synonymy & References

†***Amblygoniolepidus polystichus*** David 1956:589-590, text-fig. 20, tables 2, 3.

Type Specimen: †***Amblygoniolepidus polystichus*** David 1956, holotype, LACM (CIT) 10502, scale. **Macruridae.**
Type Locality: Texas Company Pioneer Unit Plan well number 1, Sunset District, San Joaquin Valley, Early Miocene (Zemorrian), Kern County.
Referred Specimens: None.

Genus †*Homeocoryphaenoides* David 1956

†*Homeocoryphaenoides chiasmacanthus* David 1956

Selected Synonymy & References

†***Homeocoryphaenoides chiasmacanthus*** David 1956:591, text-fig. 22, tables 2, 3.

Type Specimen: †***Homeocoryphaenoides chiasmacanthus*** David 1956, holotype, LACM (CIT) 10491, scale, whereabouts unknown. **Macruridae.**

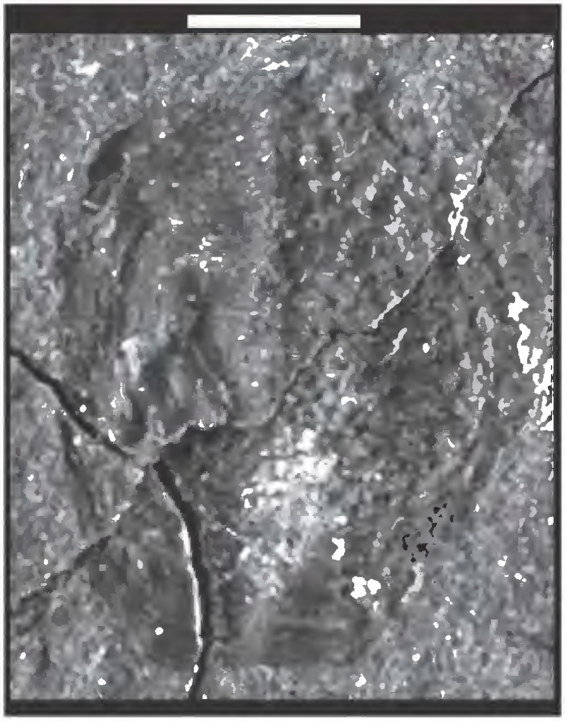


FIGURE 29. †***Amblygoniolepidus polystichus*** David 1956, holotype, LACM (CIT) 10502 (from color image provided by LACM); scale bar equals 1 mm.

Type Locality: LACM (CIT) locality 4364, Texas Company Newman well number 1, Kern River District, San Joaquin Valley, Early Miocene (Saucesian), Kern County.
Referred Specimens: None.

Genus †*Calilepidus* David 1956
†*Calilepidus tauxei* David 1956
Figure 30

Selected Synonymy & References
†***Calilepidus tauxei*** David 1956:591-592, plate 72, fig. 5, tables 2, 3.

Type Specimen: †***Calilepidus tauxei*** David 1956, holotype, LACM (CIT) 10501, scale. **Macruridae.**
Type Locality: LACM (CIT) locality 4364, Texas Company Newman well number 1, Kern River District, San Joaquin Valley, Early Miocene (Saucesian), Kern County.
Referred Specimens: None from California.
Distribution of Neogene †*C. tauxei* outside of California: None known, but the referred specimen is, LACM (CIT) 10516, scale, near Mist, Keasey Formation, Eocene-Oligocene (Refugian), Oregon. Specimen is doubtfully referred to †***C. tauxei***.

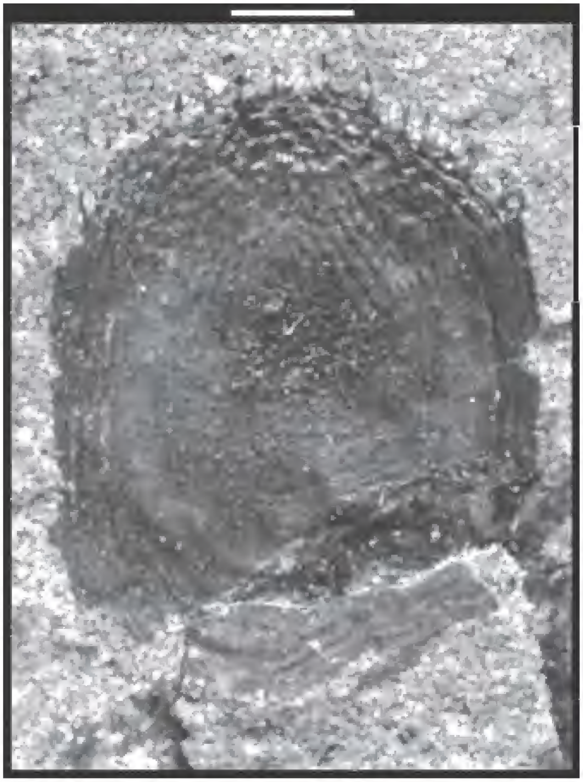


FIGURE 30. †*Calilepidus tauxei* David 1956, holotype, LACM (CIT) 10501 (from color image provided by LACM); scale bar equals 1 mm.

Genus †*Leptacantholepidus* David 1956

†*Leptacantholepidus delmontianus* David 1956

Figure 31

Selected Synonymy & References

†*Leptacantholepidus delmontianus* David 1956:592-594, pl. 72, fig. 4; text-figs. 24, 24, tables 2, 3.

Type Specimen: †*Leptacantholepidus delmontianus* David 1956, holotype, LACM (CIT) 10487, scale. **Macruridae.**

Type Locality: LACM (CIT) locality 4371, Ohio Oil Company Bear State well number 23, Fruitvale District, Late Miocene (upper Mohnian), Kern County.

Referred Specimens: From LACM (CIT) locality 4372, General Petroleum Oil Company well Mocco No. 218, Middle-Late Miocene (Delmontian or upper Mohnian): three scales, LACM (CIT) 10484-10486.

†*Leptacantholepidus rotundus* David 1956

Figure 32

Selected Synonymy & References

†*Leptacantholepidus rotundus* David 1956:594, text-figs 25, tables 2, 3.

Type Specimen: †*Leptacantholepidus rotundus* David 1956, holotype, LACM (CIT) 10492, scale. **Macruridae.**

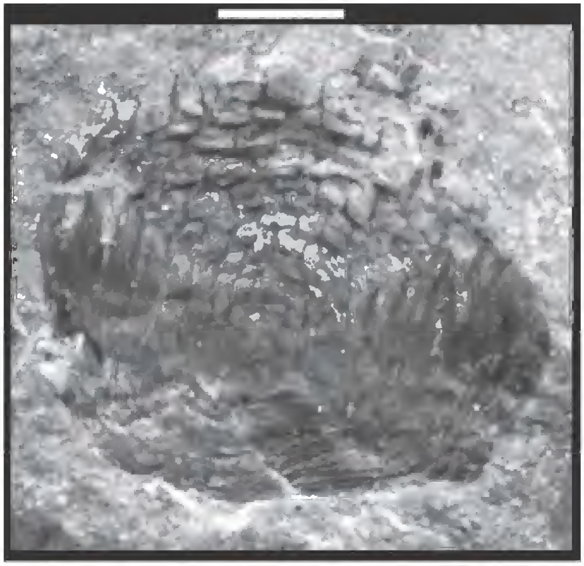


Figure 31. †***Leptacantholepidus delmontianus*** David 1956, holotype, LACM (CIT) 10487 (from color image provided by LACM); scale bar equals 1 mm.

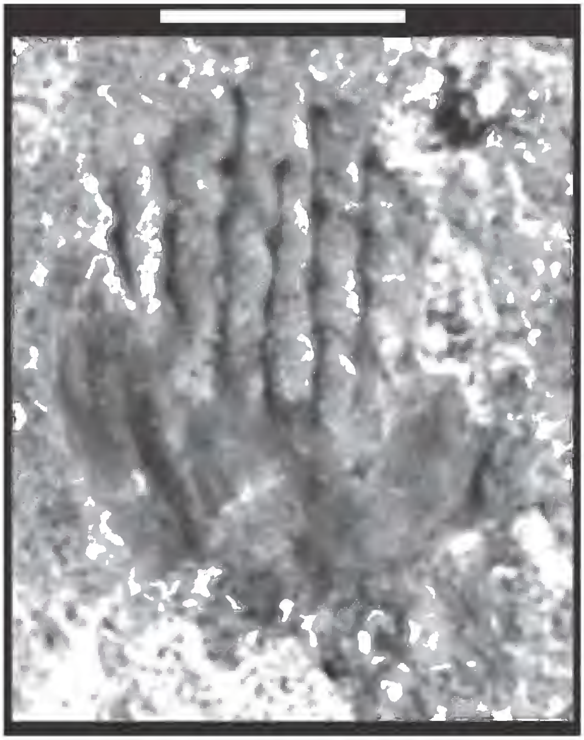


Figure 32. †***Leptacantholepidus rotundus*** David 1956, holotype, LACM (CIT) 10492 (from color image provided by LACM); scale bar equals 1 mm.

Type Locality: LACM (CIT) locality 4373, Ohio Oil Company Bear State well number 23, Fruitvale District, Late Miocene (upper Mohnian), Kern County.

Paratypes: From type locality: three scales, LACM (CIT) 10493-10495.

Genus †*Homeomacrurus* David 1956

†*Homeomacrurus fernandensis* David 1956

Figure 33

Selected Synonymy & References

†*Homeomacrurus fernandensis* David 1956: 594-595, pl. 72, fig. 3; text-fig. 26.

Type Specimen: †*Homeomacrurus fernandensis* David 1956, holotype, LACM (CIT) 10505, scale. **Macruridae.**

Type Locality: LACM (CIT) locality 4374, Texas Compay Towle well number 1, Late Miocene (upper Delmontian).

Paratypes: LACM (CIT) 10512-10513, two scales from LACM (CIT) locality 4373, supposedly the type locality, however LACM CIT) locality 4373 is described as Ohio Oil Company Bear State well number 23, Fruitvale District, Late Miocene, Kern County (see Remarks).

Referred Specimens: From Texas Company well Fernando No. 1, Early Pliocene: six scales, LACM (CIT) 10506-10511 (see Remarks).

Remarks: According to the LACM database, the paratypes were collected from LACM (CIT) locality 4377. David (1956) reported five scales, but six specimens are listed in the LACM database, four from LACM (CIT) locality 4382: LACM CIT) 10508-10511; one from LACM (CIT) locality 4380: LACM (CIT) 10506; one from LACM (CIT) locality 4381: LACM (CIT) 10507.

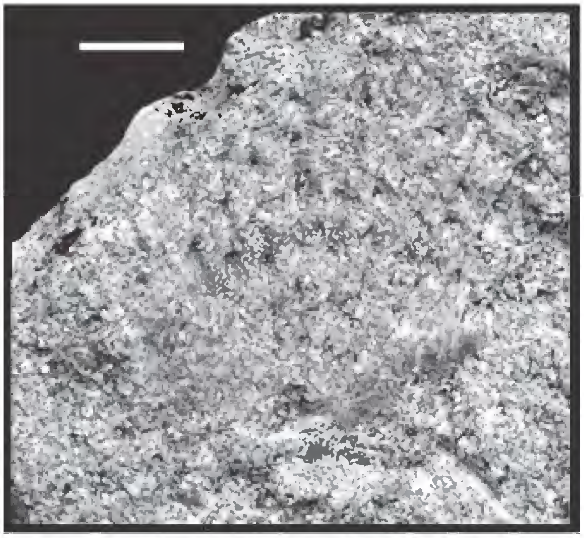


FIGURE 33. †*Homeocmacrurus fernandensis* David 1956, holotype, LACM (CIT) 10505 (from color image provided by LACM); scale bar equals 1 mm.

Genus †*Promacrurus* David 1956

†*Promacrurus zemorrianus* David 1956

Selected Synonymy & References

†Macrouridae genus and species undet.: David 1944:pl. 2, figs. 18, 18a.

†*Promacrurus zemorrianus* David 1956:580-581, text-fig. 10, tables 1-3.

Type Specimen: †***Promacrurus zemorrianus*** David 1956, holotype and type species of genus LACM (CIT) 10454, scale, whereabouts unknown. **Macruridae.**

Type Locality: Texas Company Pioneer Unit Plan well number 1, Sunset District, San Joaquin Valley, Early Miocene (Zemorrian), Kern County.

Paratypes: From type locality at different depths: eight scales, LACM (CIT) 10455-10462, whereabouts unknown.

†*Promacrurus newmani* David 1956

Figure 34

Selected Synonymy & References

†*Promacrurus newmani* David 1956:583-584, text-fig. 12, tables 1-3.

Type Specimen: †***Promacrurus newmani*** David 1956, holotype, LACM (CIT) 10497, scale (text-fig. 12). **Macruridae.**

Type Locality: LACM (CIT) locality 4363, Texas Company Newman well number 1, Kern River District, San Joaquin Valley, Early Miocene (Saucesian), Kern County.

Paratypes: From type locality: three scales, LACM (CIT) 10498-10500.

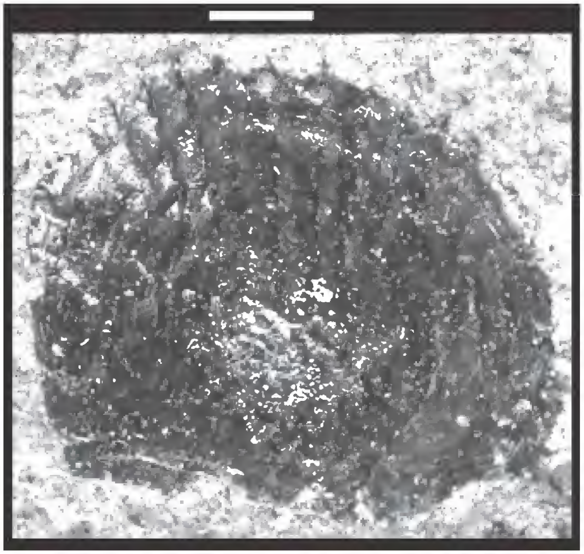


FIGURE 34. †*Promacrurus newmani* David 1956, holotype, LACM (CIT) 10497 (from color image provided by LACM); scale bar equals 1 mm.

†*Promacrurus saucesianus* David 1956

Figure 35

Selected Synonymy & References

†*Promacrurus saucesianus* David 1956:586-587, text-fig. 16, tables 2, 3.

Type Specimen: †***Promacrurus saucesianus*** David 1956, holotype, LACM (CIT) 10488, scale (text-fig. 16). **Macruridae.**

Type Locality: Texas Company Newman well number 1, Kern River District, San Joaquin Valley, Early Miocene (Saucesian), Kern County.

Paratypes: From type locality: three scales, LACM (CIT) 10489-10490 and 10496 [LACM catalog lists 10496 from LACM (CIT) locality 4366, but the other paratypes are not listed in the LACM catalog].

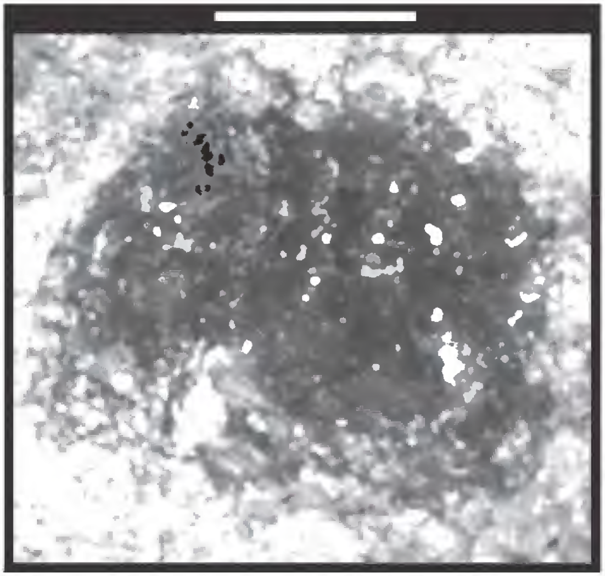


FIGURE 35. †*Promacrurus saucesianus* David 1956, holotype, LACM (CIT) 10488 (from color image provided by LACM); scale bar equals 1 mm.

Genus †*Homeonezumia* David 1956

†*Homeonezumia multispinosus* David 1956

Figure 36

Selected Synonymy & References

†*Homeonezumia multispinosus* David 1956:588-589, text-fig. 19, tables 2, 3.

Type Specimen: †*Homeonezumia multispinosus* David 1956, holotype, LACM (CIT) 10503, scale. **Macruridae.**

Type Locality: Texas Company Pioneer Unit Plan well number 1, Sunset District, San Joaquin Valley, Early Miocene (Zemorrian), Kern County.

Paratype: From type locality: LACM (CIT) 10504, scale.

Family **Macrouridae** genus and species undetermined

Referred Specimens in David (1944:32-33, pl. 2, figs 16-20, pl. 3, figs 26, 27): From Texas Company Pioneer Unit Plan well number 1, Sunset District, San Joaquin Valley, Early Miocene (Zemorrian), Kern County; six scales (pl. 2, figs. 16-20), whereabouts unknown.

From Texas Company Newman well number 1, Kern River District, San Joaquin Valley, Early Miocene (Saucesian), Kern County; two scales (pl. 3, figs. 26, 27), whereabouts unknown.

Referred Specimens in Fitch and Lavenberg (1968:74): They state "macrourid otoliths are occasionally found in Miocene and younger deposits in California, whereas scales are abundant in Miocene and older deposits."

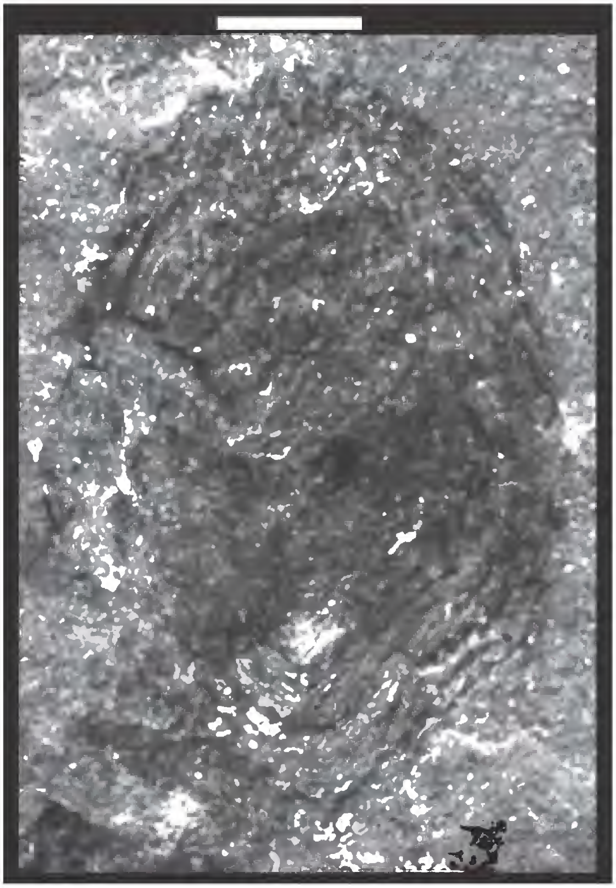


FIGURE 36. †*Homeonezumia multispinosus* David 1956, holotype, LACM (CIT) 10503 (from color image provided by LACM); scale bar equals 1 mm.

Family **Merlucciidae**

Genus †*Promerluccius* David 1956

†*Promerluccius venturaensis* David 1956

Figure 37

Selected Synonymy & References

†*Promerluccius venturaensis* David 1956:596-597, text-fig. 27, tables 2, 3.

Type Specimen: †*Promerluccius venturaensis* David 1956, holotype, LACM (CIT) 10517, scale. **Merlucciidae.**

Type Locality: LACM (CIT) locality 4361, Oxnard Oil Company Vanoni well Number 1, Early Pliocene, Ventura County.

Paratypes: From the type locality and nearby wells: numerous uncatalogued specimens in the collection of the Richfield Oil Corporation Paleontological Laboratory, Long Beach, Los Angeles County, whereabouts unknown.

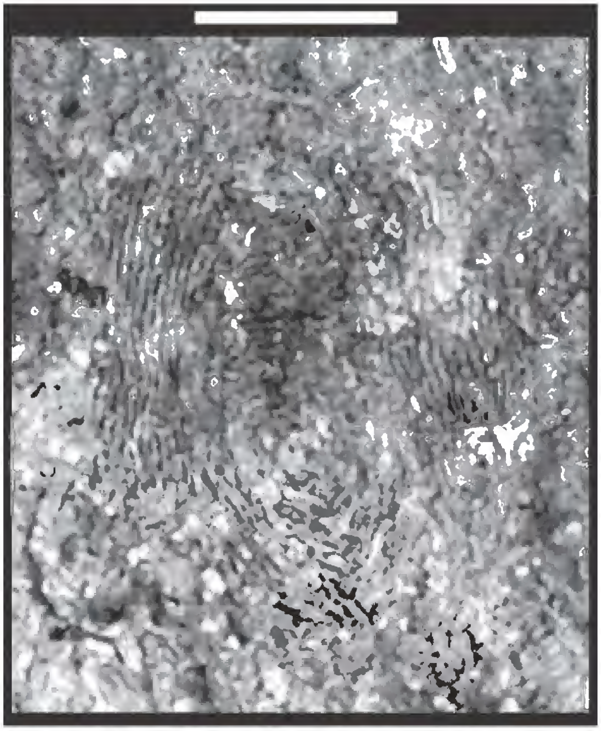


FIGURE 37. †*Promerluccius venturaensis* David 1956, holotype, LACM (CIT) 10517 (from color image provided by LACM); scale bar equals 1 mm.

Genus *Merluccius* Rafinesque 1810
Merluccius productus (Ayres 1855)

Selected References (fossils only)

Merluccius productus (Ayres): Fitch and Reimer 1967:79, 82, 84; fig. 12, table 1.
Merluccius productus (Ayres): Fitch 1968:10.
Merluccius productus (Ayres): Fitch 1969a:72, 75, 78, table 1.
Merluccius productus (Ayres): Zinsmeister 1970:124, table 1.
Merluccius productus (Ayres): Fitch and Lavenberg 1971:94.
Merluccius productus (Ayres): Nolf 1985:61.

Type Specimen: Extant, ***Merlangus productus*** Ayres1855, syntype, USNM 529.

Type Locality: Coast of California, Oregon, and Washington.

Referred Specimens in Fitch and Reimer (1967; fig. 12): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; eight poorly preserved otoliths, one figured.

Referred Specimens in Fitch(1968:10): No specific specimens. He states that otoliths have been found in many southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch 1969a): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 427 otoliths (none figured).

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 561 otoliths (none figured).

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Late Pliocene, Orange County; no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Spceimens in Fitch and Lavenberg (1971:94): No specific specimens, but they state that otoliths of *M. productus* have been recovered from numerous Pliocene deposits in California.

Referred Specimens in Nolf (1985:61): No specific specimens. He refers to the otoliths reported by Fitch (1968) from the Pliocene and Pleistocene of California.

Remarks: Fitch (1969a) also reported 55 otoliths of ***M. productus*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Gadidae**

Genus †*Eclipes* Jordan and Gilbert 1919a

†***Eclipes santamonicae*** David 1943

Figure 38

Selected Synonymy & References

†***Eclipes santamonicae*** David 1943:19-20, pl. 5, fig. 4.
†***Eclipes santamonicae*** David: David 1956:576, tables 2, 3.

Type Specimen: †***Eclipes santamonicae*** David 1943, holotype, LACM (CIT) 10223, right counterpart. **Gadidae**.

Type Locality: LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Referred Specimens: From type locality: number 10 of Layton collection, whereabouts unknown.

From LACM (CIT) locality 320 (near type locality), Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10009, left and right counterparts.

Referred Specimens in David (1956): No specific specimens mentioned.

Remarks: Mentions no. 21 of the Layton collection from the type locality, but does not discuss specimen.

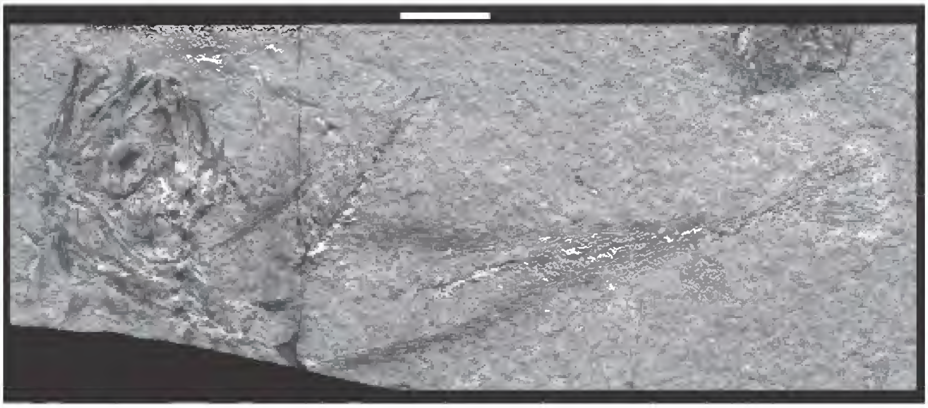


FIGURE 38. †***Eclipes santamonicae*** David 1943, holotype, LACM (CIT) 10223 (from a color image provided by LACM); scale bar equals 2 cm.

†*Eclipes veternus* Jordan and Gilbert 1919a

Figure 39

Selected Synonymy & References

†***Eclipes veternus*** Jordan and Gilbert 1919a:47-48, pl. 8, fig. 4.
†***Eclipes veternus*** Jordan and Gilbert: Jordan and Gilbert 1920:41.
†***Merriamina ectenes*** Jordan and Gilbert 1919a:56, pl. 27, figs. 1, 3: Jordan and Gilbert 1920:41.
†***Eclipes veternus*** Jordan and Gilbert: Jordan 1921a:260-262, pl. 31b (restoration).
†***Eclipes veternus*** Jordan and Gilbert: David 1943:20-22, pl. 5, fig. 3.
†***Eclipes veternus*** David: David 1956:576, tables 2, 3.

Type Specimen: †***Eclipes veternus*** Jordan and Gilbert 1919a, holotype, CAS 55414 (SU 9, 102) nearly complete left counterpart. **Apogonidae.**

Type Locality: El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimens: None.

Referred Specimens in Jordan and Gilbert (1920): SU 40, 54, and 190; whereabouts unknown. **Brotulidae.**

Referred Specimens of †*E. veternus* and Holotype of †*Merriamina ectenes* in Jordan (1921a): No referred specimens other than the holotype and referred specimens of †*M. ectenes*: From the type locality: SU 8, holotype, right counterpart, whereabouts unknown; CAS 55402 (SU 109), labeled as a paratype, and five specimens whereabouts unknown, SU 14 (left counterpart), 38, 107, 110, and 111. **Gadidae.**

Referred Specimens in David (1943): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10230, partial left counterpart. **Gadidae.**

Referred Specimens in David (1956): No specific specimens mentioned, but listed as an additional collection site to the type locality: Late Miocene, Alhambra, Los Angeles County.

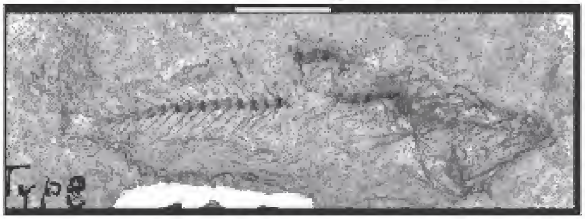


FIGURE 39. †*Eclipes veternus* Jordan and Gilbert 1919a, holotype, CAS 55414 (from color image provided by CAS); scale bar equals 1 cm.

†*Eclipes manni* Jordan 1921a

Figure 40

Selected Synonymy & References

†***Eclipes manni*** Jordan 1921a:260, pls. 12, 31 (restoration).
†***Eclipes manni*** Jordan: Jordan 1925:17.
†***Eclipes manni*** Jordan: David 1943:126, text-fig. 23.
†***Eclipes manni*** Jordan: David 1956:576, tables 2, 3.

Type Specimen: †***Eclipes manni*** Jordan 1921a, holotype, CAS 55469 (SU 34, 543), complete left counterpart. **Gadidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan (1921a): SU 53, whereabouts unknown.

Referred Specimens in Jordan (1925): From type locality: CAS 55486 (SU 631 and 631A, right and left counterparts; CAS 55474 (SU 674), partial right counterpart; SU 664, whereabouts unknown.

Referred Specimens in David (1943): From Lompoc: holotype and CAS 55407 (SU 36, 96), counterpart; 55474 (SU 37, 674), partial right counterpart; 55586 (SU 104, 631), partial right counterpart; 55479 (SU 105, 218), partial counterpart; SU 35 (53), whereabouts unknown. Also from Lompoc (see text-fig. 23): SBMNH 141, nearly complete right counterpart, whereabouts unknown.

Referred Specimens in David (1956): No specific specimens mentioned.

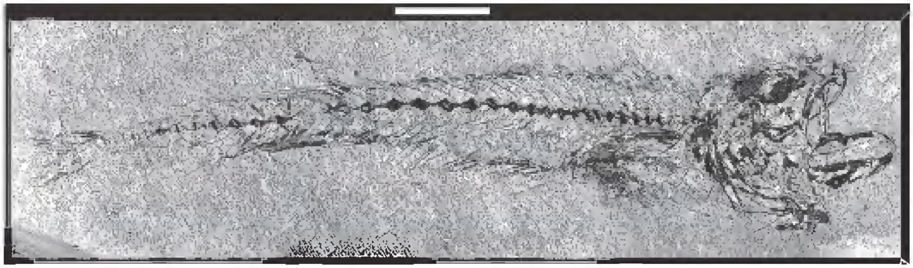


FIGURE 40. †*Eclipes manni* Jordan 1921a, holotype, CAS 55469 (from color image provided by CAS); scale bar equals 5 cm.

†*Eclipes extensus* Jordan 1921a

Figure 41

Selected Synonymy & References

†***Eclipes extensus*** Jordan 1921a:261-262, pl. 9c.
†***Eclipes extensus*** Jordan: David 1956:576, tables, 2, 3.

Type Specimen: †***Eclipes extensus*** Jordan 1921a, holotype, CAS 55426 (SU 716 and 716A, 103), right and left counterparts). **Gadidae.**

Type Locality: Late Miocene, Alhambra, Los Angeles County.

Referred Specimens: CAS 55430 (SU 718), partial right counterpart; SU 717, whereabouts unknown.

Referred Specimens in David (1956): No specific specimens mentioned.

Remarks: In Jordan (1921a), the legend of plate 9 is very confusing (unable to determine which specimen is SU 716).

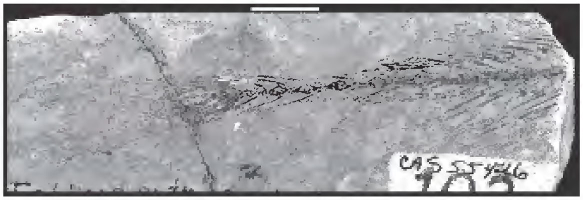


FIGURE 41. †*Eclipes extensus* Jordan 1921a, holotype, CAS 55426 (from color image provided by CAS); scale bar equals 1 cm.

†*Eclipes* cf. †*E. extensus* Jordan

Selected Synonymy & References

cf. †***Eclipes extensus*** Jordan: David 1943:86.

Referred Specimen: From LACM (CIT) locality 341, Palos Verdes, Altamira shale Member, Monterey Formation, Middle-Late Miocene, Los Angeles County; LACM (CIT) 10103, right and left counterparts.

†*Eclipes* sp.

Selected Synonymy & References

?†***Eclipes* sp.**: David 1943:73.
†***Eclipes* sp.**: David 1956:576, tables 2, 3.

Referred Specimen in David (1943): From LACM (CIT) locality 382, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; tail fragment of a Los Angeles City College specimen, whereabouts unknown.

From LACM (CIT) locality 380, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; an uncatalogued fragment.

Referred Specimens in David (1956): No specific specimens mentioned, but stated that they were identified from the Santa Monica Mountains, Upper Modelo Formation, Late Miocene (Upper Mohnian), Los Angeles County.

Genus †*Progadus* David 1956

†*Progadus pliocenicus* David 1956

Figure 42

Selected Synonymy & References

†*Progadus pliocenicus* David 1956:576-578, pl. 71, figs. 3-5; text-fig. 8, tables 2, 3.

Type Specimen: †***Progadus pliocenicus*** David 1956, holotype, LACM (CIT) 10453, scale. **Gadidae.**

Type Locality: LACM (CIT) locality 4360, Oxnard Oil Company Vanoni well Number 1, Early Pliocene, Ventura County.

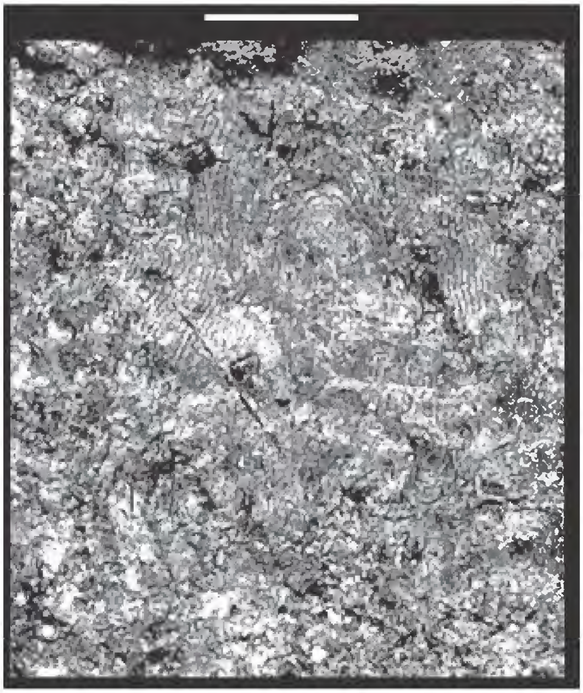


FIGURE 42. †*Progadus pliocenicus* David 1956, holotype, LACM (CIT) 10453 (from color image provided by LACM); scale bar equals 1 mm.

†*Progadus miocenicus* David 1956

Selected Synonymy & References

†*Progadus miocenicus* David 1956:578-579, pl. 71, fig. 6; text-fig. 9.

Type Specimen: †***Progadus miocenicus*** David 1956, holotype, Richfield Oil Corporation Paleontological Laboratory, Long Beach type number 13, scale, whereabouts unknown. **Gadidae.**

Type locality: Richfield Oil Corporation well Guernsey Number 1, Late Miocene, Wilmington, Los Angeles County.

Genus †*Arnoldites* Jordan 1923

†*Arnoldites iniistia* (Jordan and Gilbert 1919b)

Figure 43

Selected Synonymy & References

†*Arnoldina iniistia* Jordan and Gilbert 1919b:63, pl. 27, fig. 2.
†*Arnoldites iniistia* (Jordan and Gilbert): Jordan 1923:164.

Type Specimen: †*Arnoldina iniistia* Jordan and Gilbert 1919b, holotype, CAS 69932 (SU 26, 99A, B), very poorly preserved right and left counterparts.

Type Locality: Pliocene deposits near Broadway tunnel, Los Angeles.

Referred Specimens: None.

Remarks: Jordan (1923:164) noted that †*Arnoldina* Jordan and Gilbert 1919b was preoccupied by †*Arnoldina* Hannibal 1917, a mollusc, thus he substituted the generic name †*Arnoldites*. A note with the specimen in the CAS collection states that figure 2 in Jordan and Gilbert (1919b) representing SU 99A is not 99A.

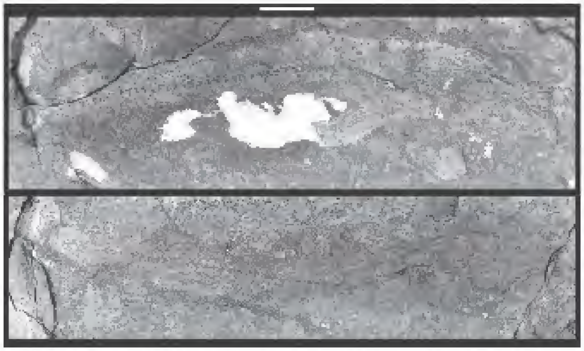


FIGURE 43. †*Arnoldites iniistia* (Jordan and Gilbert 1919b), holotype, CAS 69932 (from color image provided by CAS); scale bar equals 1 cm.

Genus **Microgadus** Gill 1865

Microgadus proximus (Girard 1854b)

Selected References (fossils only)

Microgadus proximus (Girard 1854b): Fitch 1967:10.
Microgadus proximus (Girard): Fitch and Reimer 1967:79, 82, 84; fig. 9, table 1.
Microgadus proximus (Girard): Fitch 1968:10.
Microgadus proximus (Girard): Zinsmeister 1970:124, table 1.
Microgadus proximus (Girard): Fitch and Lavenberg 1971:74.
Microgadus proximus (Girard): Nolf 1985:62.

Type Specimen: Extant, ***Gadus proximus*** Girard 1854b, three syntypes, USNM 524.

Type Locality: San Francisco, California.

Referred Specimens in Fitch (1967:10): He notes that otoliths are rare in southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:10): In contrast to Fitch (1967), he states that otoliths are abundant in southern California Pliocene deposits.

Referred Specimens in Fitch and Reimer (1967: fig. 9): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one broken otolith.

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County;

no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Fitch and Lavenberg (1971:74): No specific specimens mentioned. Otoliths of ***M. proximus*** are abundant in several Pliocene deposits that outcrop in northern California and Oregon.

Referred Specimens in Nolf (1985:62): No specific specimens. He notes that Fitch (1967) has found otoliths in the California Pliocene.

Distribution of Neogene ***M. proximus*** outside of California: Oregon (see Fitch and Lavenberg 1971).

Order **Ophidiiformes**

Family **Bythitidae**

Genus ***Brosmophycis*** Gill 1861c

Brosmophycis marginata (Ayres 1854)

Selected Synonymy & References

Brosmius marginatus Ayres 1854:102.
Brosmophycis marginata (Ayres): Fitch 1967:17, 19-21, table 2.
Brosmophycis marginata (Ayres): Fitch 1968:24.
Brosmophycis marginata (Ayres 1854): Eschmeyer and Herald 1983:103.

Type Specimen: Extant, ***Brosmius marginatus*** (Ayres 1854), no types known (Eschmeyer 1998:1019).

Type Locality: San Francisco Bay, California.

Referred Specimens in Fitch (1967:17, 19-21, table 2): No specific specimens. Fitch (1967:17) makes the general statement that otoliths of ***B. marginata*** have been found in several southern California Pliocene and Pleistocene deposits. On page19 he mentioned that otoliths of ***B. marginata*** were present in a specific site:

LACMIP locality 435, Miraleste Canyon, San Pedro, Lomita Marl, Late Pliocene, Los Angeles County (see Remarks).

Referred Specimens in Fitch (1968:24): No specific specimens. Otoliths of ***B. marginata*** have been found in several southern California Pliocene and Pleistocene localities.

Remarks: Fitch (1967) reported otoliths of ***B. marginata*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999). Because this is the only specific locality named by Fitch (1969:19), then the presence of ***B. marginata*** in the Neogene is questionable.

Family **Ophidiidae**

Genus ***Chilara*** Jordan and Evermann 1896a

Chilara taylori (Girard 1858)

Selected Synonymy & References

Ophidion taylori Girard 1858:138.
Otophidium taylori (Girard): Fitch 1967:19-21.
Otophidium taylori (Girard): Fitch and Reimer 1967:79, 84, 88; fig. 16.
Otophidium taylori (Girard): Downs 1968:53, text-fig. 25.
Otophidium taylori (Girard): Fitch 1968:24.
Otophidium taylori (Girard): Fitch and Lavenberg 1968:75.
Otophidium taylori (Girard): Zinsmeister 1970:124, table 1.
Chilara taylori (Girard): Eschmeyer and Herald 1983:102.
Chilara taylori (Girard): Nolf 1985:64.

Type Specimen: Extant, ***Ophidion taylori*** Girard 1858, syntypes, MCZ 35928 and others (Eschmeyer 1998: 1655).

Type Locality: Monterey, California.

Referred Specimens in Fitch (1967:19-21): No specific specimens, just mentioned that otoliths of ***O. taylori*** were abundant in the following deposits:

LACMIP locality 305 (= LACM locality 44213), San Diego, San Diego Formation, Late Pliocene, San Diego County.

LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County (see Remarks).

Referred Specimens in Fitch and Reimer (1967:79, 84, 88; fig. 16): From LACMIP locality 423, Signal Hill, Fernando Formation, Late Pliocene, Los Angeles County; 45 otoliths (one in Fig. 16) (see Remarks).

Referred Specimens in Downs (1968:53; text-fig. 25c): Made the general statement that otoliths of ***O. taylori*** were found in Pliocene and Pleistocene deposits of Southern California and figured one in text-fig. 25c.

Referred Specimens in Fitch (1968:24): No specific specimens. He states that otoliths of ***O. taylori*** are abundant in many southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch and Lavenberg (1968:75): Mentioned that otoliths of ***O. taylori*** are common constituents of marine Pliocene deposits throughout California.

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; no specific specimens, just that otoliths of ***O. taylori*** were present.

Referred Specimens in Nolf (1985:64): No specific specimens. He stated that otoliths of ***C. taylori*** were reported from the California Pliocene by Fitch (1968).

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***O. taylori*** from this locality is questionable. Fitch (1967) also reported otoliths of ***O. taylori*** from LACMIP locality 435 (Lomita Marl, Pliocene, Los Angeles County), however this locality is considered Pleistocene (Blake 1991; Dibblee 1999).

Genus ***Ophidion*** Linnaeus 1758
Ophidion scrippsae (Hubbs 1916)

Selected References (fossils only)

Otophidium scrippsae Hubbs 1916: Fitch and Reimer 1967:79, 84 88, table 1, fig. 13.
Otophidium scrippsi Hubbs: Fitch and Lavenberg 1975:90.
Ophidion scrippsae (Hubbs 1916): Eschmeyer 1998:1528.

Type Specimen: Extant, ***Otophidion scrippsi*** Hubbs 1916, holotype, SIO 64-283.

Type Locality: Near Cerros Island, off coast of Baja California, Mexico.

Referred Specimens in Fitch and Reimer (1967: 79, 84, 88, table 1, fig. 13): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 105 otoliths (one as fig. 13).

Referred Specimens in Fitch and Lavenberg (1975:90): No specific specimens; they state that otoliths of ***O. scrippsi*** (= ***O. scrippsae***) have been found in several Pliocene deposits in California.

Remarks: Eschmeyer (1998:1528) discussed the reason for ***Ophidion scrippsae*** being the valid name for the species. According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***O. scrippsae*** from this locality is questionable.

†***Ophidion ozymandias*** Jordan 1921a

Figure 44

Selected Synonymy & References

†***Ozymandias gilberti*** Jordan 1919 [in part]: Jordan *in* Jordan and Gilbert 1920:36-37, pl. 24: Jordan 1921:290.
†***Ophidion ozymandias*** Jordan 1921a:290.

Type Specimen: †***Ophidion ozymandias*** Jordan 1921a, holotype, CAS 55583 (SU 332), vertebral segment of right counterpart. **Ophiodontidae.**
Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.
Referred Specimens: None.

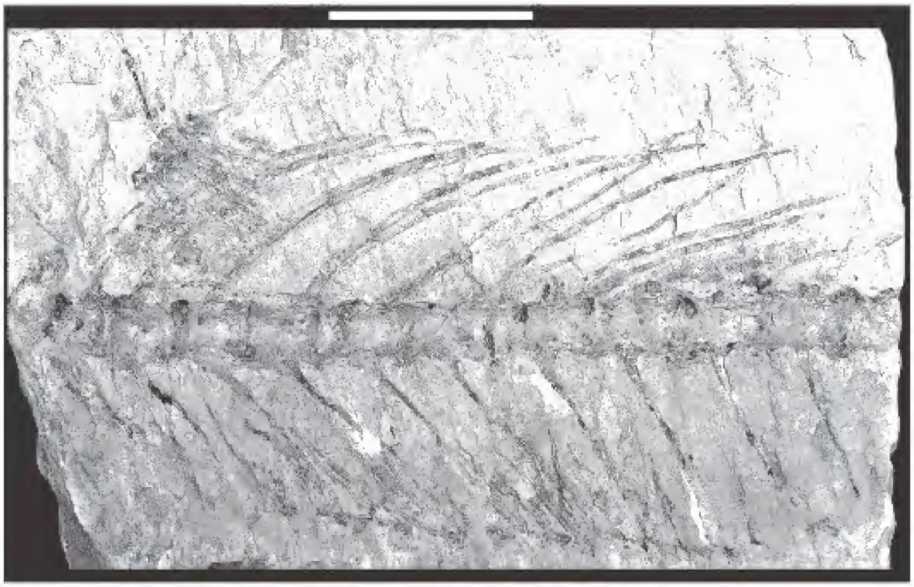


FIGURE 44. †*Ophidion ozymandias* Jordan 1921a, holotype, CAS 55583 (from color image provided by CAS); scale bar equals 5 cm.

Order **Batrachoidiformes**

Family **Batrachoididae**

Genus ***Porichthys*** Girard 1854b
Porichthys notatus Girard 1854b

Selected References (fossils only)

Porichthys notatus Girard 1854b: Fitch 1967:17.
Porichthys notatus Girard: Fitch and Reimer 1967:79, 84, 88, table 1, fig. 18.
Porichthys notatus Girard: Downs 1968:53, text-fig. 25b.
Porichthys notatus Girard: Fitch and Lavenberg 1971:35.
Porichthys notatus Girard: Nolf 1985:57.

Type Specimen: Extant, ***Porichthys notatus*** Girard, holotype, USNM 520.
Type Locality: San Francisco, California.
Referred Specimens in Fitch (1967:17): No specific specimens. He notes that otoliths of ***P. notatus*** are abundant in southern California Pliocene and Pleistocene deposits.
Referred Specimens in Fitch and Reimer (1967:79, 84, 88, table 1 fig. 18): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 14 otoliths (one as fig. 18) (see Remarks).
Referred Specimens in Downs (1968:53, text-fig. 25b): Made the general statement that otoliths of ***P. notatus*** were found in Pliocene and Pleistocene deposits of Southern California and figured one in text-fig. 25b.
Referred Specimens in Fitch (1968:23): No specific specimens. He notes that otoliths of ***P. notatus*** are usual-

ly abundant in southern California Pliocene and Pleistocene deposits, with nearly 700 having been recovered from the Pliocene Lomita Marl, San Pedro (see Remarks).

Referred Specimens in Fitch and Lavenberg (1971:35): They make the general statement that otoliths of ***P. notatus*** are abundant in Pliocene deposits throughout California.

Referred Specimens in Nolf (1985:57): No specific specimens mentioned. He notes that otoliths of ***P. notatus*** were reported from the California Pliocene by Fitch (1967).

Remarks: LACMIP locality 435 (= LACM localities 3065, 3759), Miraleste Canyon, Lomita Marl Formation, Los Angeles County, is considered Pleistocene (Blake 1991; Dibblee 1999) not Pliocene. According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***P. notatus*** from this locality is questionable.

Porichthys myriaster Hubbs and Schultz 1939

Selected References (fossils only)

Porichthys myriaster Hubbs and Schultz: Fitch and Reimer 1967:79, 84, 87, table 1, fig. 15.
Porichthys myriaster Hubbs and Schultz: Fitch and Lavenberg 1975:28.

Type Specimen: Extant, ***Porichthys myriaster*** Hubbs and Schultz 1939, holotype, USNM 8483.

Type Locality: San Diego, California.

Referred Specimens in Fitch and Reimer (1967:79, 84, 87, table 1, fig. 15): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one otolith (fig. 18).

Referred Specimens in Fitch and Lavenberg (1975:28): They make the general statement that otoliths of ***P. myriaster*** have been found in several Pliocene deposits in Southern California.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***P. myriaster*** from this locality is questionable.

Order **Lophiiformes**
Suborder **Lophioidei**

Family **Lophiidae**

Genus †***Emmachaere*** Jordan and Gilbert 1919a
†***Emmachaere rhachites*** Jordan and Gilbert 1919a

Figure 45

Selected Synonymy & References

†***Emmachaere rhachites*** Jordan and Gilbert 1919a:59, pl. 28 fig. 2.
†***Emmachaere rhachites*** Jordan and Gilbert: Jordan and Gilbert 1920:26-27, pls. 15, 16.
†***Emmachaere rhachites*** Jordan and Gilbert: Jordan 1921a:277.
†***Emmachaere rhomalea*** Jordan 1921a:278, pl.43 (restoration).
not †***Emmachaere rhomalea*** Jordan: Jordan 1925:30: David 1943:130.
†***Emmachaere rhomalea*** Jordan: Jordan 1927a:9.
†?***Epinephelus*** **(*Emmachaere*)** ***rhomalea*** Jordan: David 1943: 129-131, text-fig. 24.
†?***Epinephelus*** **(*Emmachaere*)** ***rhomalea*** Jordan: Schultz 2000: 38.
†***Emmachaere rhachites*** Jordan and Gilbert: Schultz 2006:431.

Type Specimen: †***Emmachaere rhachites*** Jordan and Gilbert, holotype, CAS 69933 (SU165, 143 or 43?), partial right counterpart. **Lophiidae (?)**.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

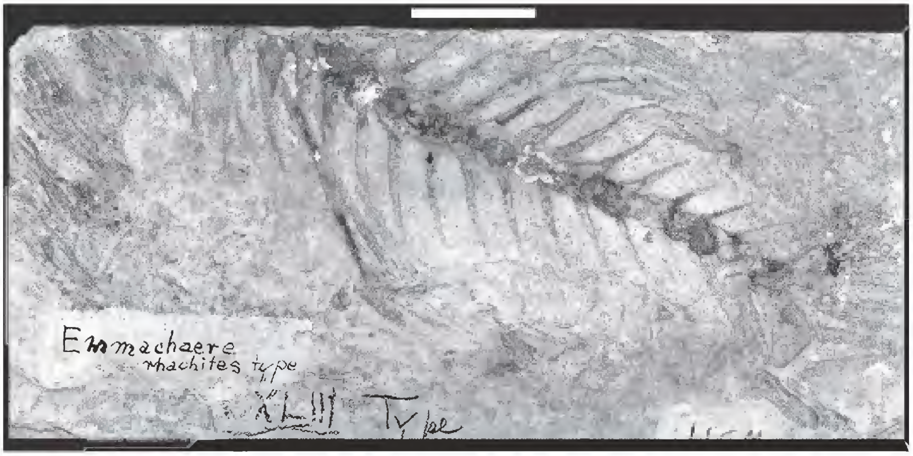


FIGURE 45. †*Emmachaere rhachites* Jordan and Gilbert 1919a, holotype, CAS 69933 (from color image provided by CAS); scale bar equals 3 cm.

Referred Specimens of †*E. rhachites* in Jordan and Gilbert (1920): From Lompoc: SU 220, whereabouts unknown; CAS 70002 (SU 22, 311), partial left counterpart, listed as a paratype in CAS collection. **Serranidae.**

Referred Specimens and Holotype of †***E. rhomalea*** Jordan (1921a): Holotype, SU 21 (220), nearly complete right counterpart, whereabouts unknown; CAS 70002 (SU 22, 311), partial left counterpart. **Serranidae.**

Referred Specimens of †***E. rhomalea*** in Jordan (1925:30): CAS 70111 (SU 663, 39), fairly complete right counterpart. **Epinephelidae.**

Referred Specimens †***E. rhomalea*** in Jordan (1927a): SU 469, whereabouts unknown; assigned to **Epinephelidae.**

Holotype and Referred Specimens of †?***Epinephelus (Emmachaere) rhomalea*** Jordan in David (1943): From Lompoc: holotype of †***E. rhomalea*** Jordan, SU 21 (220), whereabouts unknown, and holotype CAS 69933 (SU 165, 143) of †***E. rhachites*** Jordan and Gilbert; CAS 70002 (SU 22, 311), partial left counterpart. **Epinephelidae.**

Referred Specimens †***E. rhachites*** or †***E. rhomalea*** in Schultz (2000, 2006): No specific specimens (see below).

Remarks: David (1943) placed †***E. rhachites*** Jordan and Gilbert 1919a in the synonymy of †***E. rhomalea*** Jordan 1921a, however it should have been reversed, because †***E. rhachites*** has priority. Schultz (2000:38) questioned whether there was enough morphological evidence to identify the holotype of †?***Epinephelus (Emmachaere) rhomalea*** Jordan 1921a as a serranid, let alone as ***Epinephelus***, based on the description and figure 24 in David (1943:129-131). Later, Schultz (2006:431) listed †***E. rhachites*** (= †***E. rhomalea***) among the Cenozoic **Lophiidae.**

It is unclear why David (1943:130) wrote "not" in front of †***E. rhomalea***, a specimen CAS 70111 (SU 663, 39) that Jordan (1925:30) included in the species.

The CAS catalogue lists CAS 55572 as a paratype for †***E. rhomalea***.

Suborder **Ceratioidei (= Ogcocephaloidei)**

Family **Oneirodidae**

Genus ***Chaenophryne*** Regan 1925
Chaenophryne* aff. *melanorhabdus Regan and Trewavas 1932:
Carnevale et al., 2008:998, figs. 2, 3, 4.1

Referred Material: From LACM locality 6202, Yorba Member, Puente Formation, early Late Miocene, Los Angeles, Los Angeles County; LACM 136809, complete articulated skeleton; LACM 136810, complete articulated skeleton; LACM 137674, complete articulated skeleton; LACM 137703, complete articulated skeleton. **Oneirodidae**.

Remarks: Carnevale et al. (2008) were usure of the exact age of the locality, whereas Takeuchi and Huddleston (2008:281) referred LACM locality 6202 to the upper part of the Puente Formation, early Late Miocene.

Genus ***Leptacanthichthys*** Regan and Trewavas 1932
Leptacanthichthys* cf. *gracilispinis (Regan 1925):
Carnevale et al., 2008:1000-1001, figs. 5, 6

Referred Material: From LACM locality 6202, Yorba Member, Puente Formation, early Late Miocene, Los Angeles, Los Angeles County; LACM 137899, articulated specimen preserved in right and left counterparts. **Oneirodidae**.

Remarks: See remarks for ***Chaenophryne***.

Genus ***Oneirodes*** Lutken 1871
***Oneirodes* sp.**: Carnevale et al., 2008:1001, figs. 7, 8

Referred Material: From LACM locality 6202, Yorba Member, Puente Formation, early Late Miocene, Los Angeles, Los Angeles County; LACM 138207, articulated specimen, incomplete and moderately well-preserved. **Oneirodidae**.

Remarks: See remarks for ***Chaenophryne***.

Family **Linophrynidae** Regan 1925

Genus ***Acentrophryne*** Regan 1926
***Acentrophryne* sp.**: Carnevale and Pietsch 2009

Selected Synonymy & References

Acentrophryne longidens Regan 1926: Pietsch and Lavenberg 1980:907, fig. 1.
***Acentrophryne* sp.**: Pietsch and Shimazaki 2005:249.
Acentrophryne longidens Regan: Huddleston and Takeuchi 2006:33, table 1.
***Acentrophryne* sp.**: Carnevale et al. 2008:1006.
***Acentrophryne* sp.**: Carnevale and Pietsch 2009:372-378, figs. 1-3.

Referred Material of ***A. longidens*** in Pietsch and Lavenberg (1980): From LACM locality 6908, Yorba Member of the Puente Formation, Late Miocene, City of Industry, Los Angeles County; LACM 117685, a single articulated well-preserved specimen. **Linophrynidae**.

Referred Material of ***Acentrophryne* sp.** in Pietsch and Shimazaki (2005): Same specimen as Pietsch and Lavenberg (1980). **Linophrynidae**.

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Referred Material of ***Acentrophryne* sp.** in Carnevale et al. (2008): Refers to specimens described by Pietsch and Lavenberg (1980). **Linophrynidae**.

Referred Material of ***Acentrophryne* sp.** in Carnevale and Pietsch (2009): **S**ame specimen as Pietsch and Lavenberg (1980). **Linophrynidae**.

Remarks: See remarks for ***Chaenophryne***.

Genus *Borophryne* Regan 1925

Borophryne* cf. *B. apogon Regan 1925: Carnevale et al., 2008:1002-1003, figs. 9, 10

Referred Material: From LACM locality 6202, Yorba Member, Puente Formation, early Late Miocene, Los Angeles, Los Angeles County; LACM 137563, complete articulated skeleton; LACM 138206, complete articulated skeleton. **Linophrynidae**.

Remarks: See remarks for ***Chaenophryne***.

Genus *Linophryne* Collett 1886

Linophryne* cf. *L. indica (Brauer 1902): Carnevale et al., 2008:1003, figs. 12, 13

Referred Material: From LACM locality 6202, Yorba Member, Puente Formation, early Late Miocene, Los Angeles, Los Angeles County; LACM 137696, complete articulated skeleton in right and left counterparts. **Linophrynidae**.

Remarks: See remarks for ***Chaenophryne***.

Order **Mugiliformes**

Family **Mugilidae**

Family **Mugilidae** genus and species undetermined

Referred Specimens in Fitch and Lavenberg (1971:99 and 1975:83)): Mullet otoliths have been found in Miocene deposits near Bakersfield, California and they do not appear to be from the extant ***Mugil cephalus*** Linneaus 1758.

Order **Atheriniformes**

Family **Atherinopsidae**

Genus *Atherinops* Steindachner 1875

Atherinops affinis (Ayres 1860)

Selected References (fossils only)

Atherinops affinis (Ayres 1860): Fitch 1967:12.
Atherinops affinis (Ayres 1860): Fitch 1968:13.
Atherinops affinis (Ayres): Fitch and Lavenberg 1975:19-20.
Atherinops affinis (Ayres 1860): Nolf 1985:69.

Type Specimen: Extant, ***Atherinopsis affinis*** Ayres 1860, holotype, no specimen number given (Eschmeyer 1998:47).

Type Locality: San Francisco, California (Eschmeyer 1998:47).

Referred Specimens in Fitch (1967:12): No specific specimens. He notes that ototliths of ***A. affinis*** have been found in many southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:13): Same information as entry above.

Referred Specimens in Fitch and Lavenberg (1975:19-20): No specific specimens mentioned, but otoliths have been found in several Pliocene deposits in southern California.

Referred Specimens in Nolf (1985:69): No specific specimens. Refers to Fitch (1967) that otoliths of ***A. affinis*** are found in the Pliocene of California.

Remarks: Because Fitch (1967, 1968) and Fitch and Lavenberg (1975) did not give any specific fossil locality containing otoliths of ***A. affinis***, its presence in the Neogene of California is questionable.

Atherinops **sp.**

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Genus ***Atherinopsis*** Girard 1854a

Atherinopsis californiensis Girard 1854a

Selected References (fossils only)

Atherinopsis californiensis Girard 1854a: Fitch and Reimer 1967:79, 83-85, table 1, fig. 3.

Type Specimen: Extant, ***Atherinopsis californiensis*** Girard 1854a, syntypes, ANSP 10208-10, USNM 351 and 352 (Eschmeyer 1998:309).

Type Locality: San Francisco, California.

Referred Specimens in Fitch and Reimer (1967:79, 83-85, table 1, fig. 3): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one otolith (fig. 3).

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***A. californiensis*** from this locality is questionable.

Atherinopsis **sp.**

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Genus ***Leuresthes*** Jordan and Gilbert 1880b

Leuresthes tenuis (Ayres 1860)

Selected References (fossils only)

Leuresthes tenuis (Ayres 1860): Fitch and Lavenberg 1971:29.

Type Specimen: Extant, ***Atherinopsis tenuis*** Ayres 1860, holotype, whereabouts unknown (Eschmeyer 1998:1662).

Type Locality: San Francisco, California (Eschmeyer 1998:1662).

Referred Specimens in Fitch and Lavenberg (1971:29): Authors make the general statement that fossil grunion otoliths have been found in several southern California Pliocene deposits.

Remarks: Because Fitch and Lavenberg (1971) did not give any specific fossil locality containing otoliths of ***L. tenuis***, its presence in the Neogene of California is questionable.

Genus †***Zanteclites*** Jordan and Gilbert 1919a

†***Zanteclites hubbsi*** Jordan and Gilbert 1919a

Figure 46

Synonymy & References

†***Zanteclites hubbsi*** Jordan and Gilbert 1919a:39-40, pl. 15, fig. 3, pl. 16 (restoration).

†***Zanteclites hubbsi*** Jordan and Gilbert: Jordan and Hubbs 1919:10-12, pl. 11, fig. 40.
†***Zanteclites hubbsi*** Jordan and Gilbert: Jordan 1921a:268, pl. 29 (restortion).
†***Zanteclites hubbsi*** Jordan and Gilbert: Jordan 1925:44.
†***Zanteclites*** Jordan and Gilbert: Hubbs 1924:178.

Type Specimen: †***Zanteclites hubbsi*** Jordan and Gilbert 1919a, holotype, CAS 55436 (SU 45), partial right counterpart. **Atherinidae.**

Type Locality: Bairdstown (= El Sereno neighborhood of east Los Angeles), Monterey Formation, Late Miocene, Los Angeles County.

Referred Specimens: Refers to another specimen (no catalogue number) from Shorb (near Alhambra), ?Late Miocene, Los Angeles County.

Referred Specimens in Jordan and Hubbs (1919): Figures the type (pl. 11, fig. 40) and refers to two other specimens (undescribed and unfigured): one from El Modena, Puente Formation, Late Miocene, Orange County, and the other from Shorb (near Alhambra), Los Angeles County.

Referred Specimens in Jordan (1921): None, but mentions that two additional specimens have been found.

Referred Specimens in Jordan (1925): From Covina, Puente Formation, Late Miocene, Los Angeles County; four specimens, SU 650-653 (all unfigured), however the CAS catalogue lists only three specimens, CAS 55439 (SU 650), partial left counterpart; 55531 (SU 653), partial left counterpart; 55582 (presumably either SU 651 or 652), partial left counterpart.

Referred Specimens in Hubbs (1924): None. Author alluded to the discussion in Jordan and Hubbs (1919).

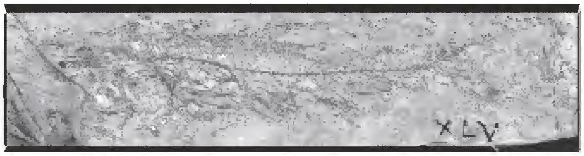


FIGURE 46. †*Zanteclites hubbsi* Jordan and Gilbert 1919a, holotype CAS 55436 (from color image provided by CAS); scale bar equals 1 cm.

†***Zanteclites* sp.**: David 1944:39, 40, 42, text-fig. 9, pl. 2, figs. 14, 14a, pl. 4, fig. 33, pl. 5, figs. 4, 4a, 4b, 5, 5a, pl. 5, fig. 48, 49, 49a, pl. 6, figs. 1-5a

Referred Specimens: From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene (Mohnian), Los Angeles County; scale (pl. 4, fig. 33, pl. 6, fig. 2), whereabouts unknown.

From Ohio Oil Company "K.C.L.-G." well number 1, Fruitvale District, Early-Middle Miocene (Zemorrian), Kern County; scale (pl. 2, fig. 14, pl. 6, fig. 1), whereabouts unknown.

From Texas Company Pioneer Unit Plan well number 1, Sunset District, San Joaquin Valley, Early Miocene (Zemorrian), Kern County; scale (pl. 2, fig. 14a, pl. 6, fig. 1a), whereabouts unknown.

From Ohio Oil Company Bear State well number 23, San Joaquin Valley, McLure shale, Late Miocene (Mohnian), Kern County; two scales (text-fig. 9, figs. 1, 2), whereabouts unknown.

From Western Gulf Oil Company Symons well no. 12-17, Buena Vista District, San Joaquin Valley, Middle-Late Miocene, Kern County; three scales (pl. 5, fig. 48a, pl. 6, figs. 3, 3a, 3b), whereabouts unknown.

From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene (Mohnian), Los Angeles County; five scales (pl. 5, fig. 48, 49, 49a, pl. 6, figs. 4, 4a, 4b, 5, 5a), whereabouts unknown.

Remarks: David (1944:42) grouped the above scales into six "forms" and suggested that that they may represent four or five different species.

Order **Beloniformes**

Family **Hemiramphidae**

Genus ***Euleptorhamphus*** Gill 1859a

†***Euleptorhamphus peronides*** (Jordan 1920b)

Figure 47

Selected Synonymy & References

†***Beltion peronides*** Jordan 1920b:571.
†***Beltion peronides*** Jordan: Jordan 1921a:257, pls. 2, 24 (restoration).
†***Lestichthys porteousi*** Jordan 1921a:250, pl. 10: David 1943:124.
†***Derrhias enantias*** Jordan 1925:15, pls. 5, 6: David 1943:124.
†***Euleptorhamphus* (*Beltion*) *peronides*** (Jordan): David 1943:124, text-fig. 22.

Type Specimen: †***Beltion peronides*** Jordan 1920b, holotype, CAS 55466 (SU 52, 209), right counterpart. **Belonidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Referred Specimens and Holotype of †*Lestichthys porteousi* Jordan reidentified by David (1943): From the type locality: CAS 55590, (SU 220, 207), holotype, nearly complete right counterpart; SU 210 (whereabouts unknown).

Referred Specimens and Holotype of *Derrhias enantias* Jordan reidentified by David (1943): From type locality: CAS 55471 (SU 613, 212) and CAS 55522 (SU 613A, 211), right and left counterparts. **Hemirhamphidae.**

Remarks: Fitch and Lavenberg (1975:72) doubt that the holotype belongs to the genus ***Euleptorhamphus***. They note that halfbeak (Hemiramphidae) otoliths found in Miocene deposits near Bakersfield, California, do not belong to ***Euleptorhamphus*** either.

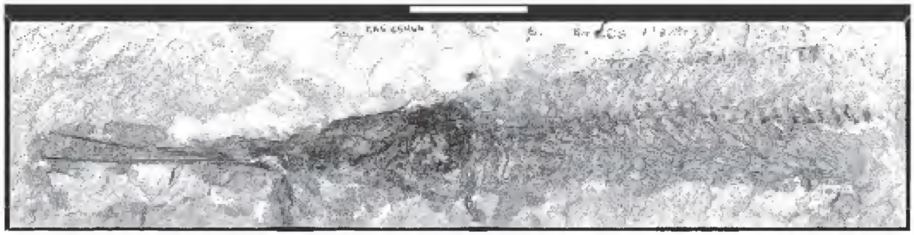


FIGURE 47. †***Euleptorhamphus peronides*** Jordan 1920b, holotype, CAS 55466 (from color image provided by CAS); scale bar equals 5 cm.

Genus †***Rogenites*** Jordan 1919

†***Rogenites bowersi*** (Jordan 1907)

Figure 48

Selected Synonymy & References

†***Rogenio bowersi*** Jordan 1907:130, fig. 24.
†***Rogenites bowersi*** (Jordan): Jordan 1919:8, pl. 2, fig. 2.
†***Rogenites bowersi*** (Jordan): Jordan 1920b:568.
†***Rogenites bowersi*** (Jordan): Jordan 1921a:255, pl. 20a (restoration).

Type Specimen: †***Rogenio bowersi*** Jordan 1907, holotype, CAS 69930 (SU 59), left counterpart. **Cobitopsidae (?).**

Type Locality: Soledad Pass, Miocene, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1919): None. †**Rogeniidae.**

Referred Specimens in Jordan (1920b): None. He only listed †***R. bowersi***. No family designation.

Referred Specimens in Jordan (1921a): None. Discussed the relationships and concluded †***R. bowersi*** belongs to the **Hemiramphidae**.

Remarks: Jordan (1907:130) did not give a specimen number for the holotype, but Jordan (1919:8) gave the specimen number as SU 59. The CAS catalog lists CAS 69930 as a paratype, however SU 59 is the only known specimen, therefore we consider it the holotype.

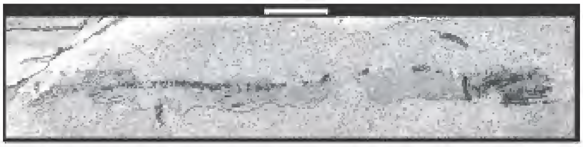


FIGURE 48. †***Rogenites bowersi*** Jordan 1907, holotype, CAS 69930 (from color image provided by CAS); scale bar equals 1 cm.

Genus †*Zelosis* Jordan and Gilbert 1920

†*Zelosis hadleyi* (Jordan and Gilbert 1919a)

Figure 49

Selected Synonymy & References

†***Clupea hadleyi*** Jordan and Gilbert 1919a:29-30, pl. 8.
†***Zelosis hadleyi*** (Jordan and Gilbert): Jordan and Gilbert 1920:24, pl. 29.
†***Zelosis hadleyi*** (Jordan and Gilbert): Jordan 1920b:571.
†***Zelosis hadleyi*** (Jordan and Gilbert): Jordan 1921a:256, pl. 26b (restoration).
†***Zelosis hadleyi*** (Jordan and Gilbert): Jordan 1925:44.

Type Specimen: †***Clupea hadleyi*** Jordan and Gilbert 1919a, holotype, CAS 55411 (SU 35, 166), partial right counterpart. **Clupeidae**.

Type Locality: Hewes (= Hews) Park, El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimen: SU 107.

Referred Specimens in Jordan and Gilbert (1920): Mentioned only the holotype. Stated that the fossil resembles †***Zaphleges*** (= †***Euzaphleges***) ***longurio***, a species we include in the †**Euzaphlegidae**.

Referred Specimens in Jordan (1920b): None, only the holotype is mentioned and considered it as probably belonging to the **Alepocephalidae**.

Referred Specimens in Jordan (1921a): None, only discussed the holotype and why it belongs to the **Hemiramphidae**.

Referred Specimens in Jordan (1925): None. He stated that in Jordan (1921a), pl. 26a was intended for †***Z. hadleyi*** and 26b for †***Zelotichthys alhambrae***.

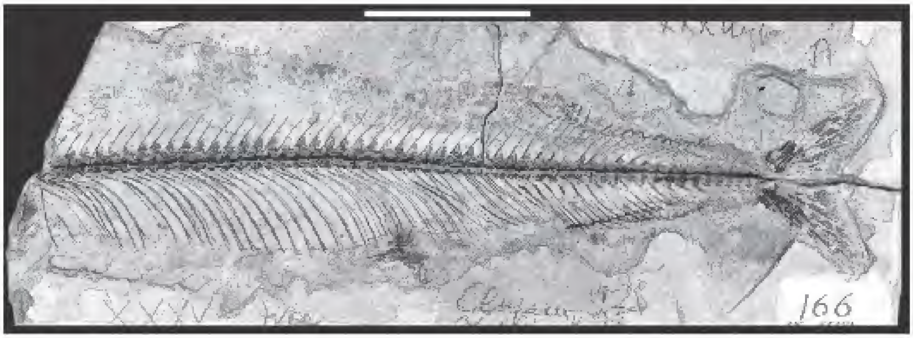


FIGURE 49. †***Zelosis hadleyi*** (Jordan and Gilbert 1919a), holotype, CAS 55411 (from color image provided by CAS); scale bar equals 5 cm.

Family **Scomberesocidae**

Genus ***Scomberesox*** Lacepède 1803
†***Scomberesox edwardsi*** Jordan and Gilbert 1919a

Figure 50

Selected Synonymy & References

†***Scomberesox edwardsi*** Jordan and Gilbert 1919a:37, pl. 18.
†***Scomberessus edwardsi*** (Jordan and Gilbert): Jordan 1921a:257.
†***Scomberesox edwardsi*** Jordan and Gilbert: David 1943:17-19.

Type Specimen: †***Scomberesox edwardsi*** Jordan and Gilbert 1919a, holotype, CAS 55437 (SU 36), anterior half of right counterpart. **Scomberesocidae.**

Type Locality: Elysian Hills, formation not stated, Miocene, Los Angeles County.

Referred Specimens: None.

Referred Specimens of †*Scomberessus edwardsi* in Jordan 1921a: None.

Referred Specimens †*Scomberesox edwardsi* in David (1943): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; number 14 of Layton collection, right counterpart, whereabouts unknown; number 13 of Layton collection, head only, whereabouts unknown.

From unknown locality: number 20 of Layton collection, lateral segment with scales, whereabouts unknown.

From unknown locality: Burbank Recreation Science Club collection, whereabouts unknown.

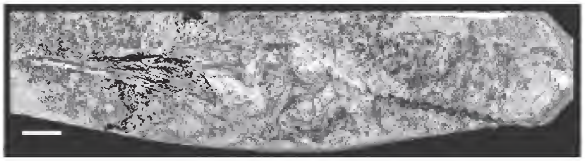


FIGURE 50. †*Scomberesox edwardsi* Jordan and Gilbert 1919a, holotype, CAS 55437 (from color image provided by CAS); scale bar equals 1 cm.

Genus †***Scomberessus*** Jordan 1920b
†***Scomberessus acutillus*** (Jordan and Gilbert 1919a)

Figure 51

Selected Synonymy & References

†***Scomberesox acutillus*** Jordan and Gilbert 1919a: 37-39, pl. 14, fig. 2.
†***Scomberessus acutillus*** (Jordan and Gilbert): Jordan 1920b:571.
†***Scomberessus acutillus*** (Jordan and Gilbert): Jordan 1921a:257, pl. 27 (restoration).

Type Specimen: †***Scomberesox acutillus*** Jordan and Gilbert 1919a, holotype, CAS 70012.02 (SU 43), unfigured.

Type Locality: Hewes (= Hews) Park, El Modena, Monterey Formation, Late Miocene, Orange County.

Paratype: CAS 55406 (SU 44, 164), nearly complete left counterpart (pl. 14, fig. 2).

Remarks: David (1943:18) noted that †***S. acutillus*** is probably the same species as †***S. edwardsi***. Because she never included †***S. acutillus*** in the synonymy of †***S. edwardsi***, we continue to recognize it as a separate species. The LACM specimen database lists LACM 1345 as a paratype of †***S. acutillus*** from LACM locality 1033. We know of no publication to support this assignment.

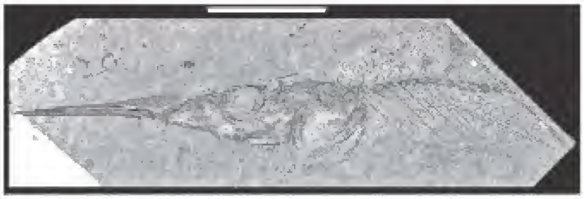


FIGURE 51. †*Scomberessus acutillus* (Jordan and Gilbert 1919a), holotype, CAS 70012.02 (from color image provided by CAS); scale bar equals 1 cm.

Family †Forficidae

Genus †*Rhomurus* Jordan 1919

†*Rhomurus fulcratus* Jordan 1919

Figure 52

Selected Synonymy & References

†*Rhomurus fulcratus* Jordan 1919:9; pl.4, figs. 3, 4, pl. 5, fig. 1 (restoration).
†*Rhomurus fulcratus* Jordan: Jordan 1921a:248.
†*Rhomurus* Jordan: Jordan 1925:44.

Type Specimen: †***Rhomurus fulcratus*** Jordan 1919, holotype, CAS 55401 (SU 50), left counterpart. †**Cobitopsidae**.

Type Locality: Soledad Pass, formation not stated, Miocene, Los Angeles County.

Referred Specimens: From Brown's Cañon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; CAS 55450 (SU 79), partial counterpart; CAS 55669 (SU 90), partial right counterpart; SU 94, whereabouts unknown. CAS 55450 and 55669 are listed as paratypes in the CAS catalog.

Referred Specimens in Jordan (1921a): Only discussed the holotype. No figure. **Dussumieriidae**.

Remarks: Jordan (1925:44) stated that the genus †***Rhomurus*** belongs in the family †**Forficidae** or possibly the **Hemiramphidae**. We place it in the former.

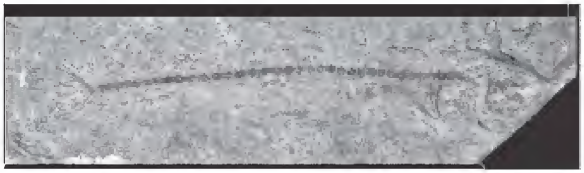


FIGURE 52. †*Rhomurus fulcratus* Jordan 1919, holotype, CAS 55401 (from color image provided by CAS); scale bar equals 1 cm.

Genus †*Forfex* Jordan 1919

†*Forfex hypuralis* Jordan 1919

Figure 53

Selected Synonymy & References

†*Forfex hypuralis* Jordan 1919:36-37, pl. 14, fig. 3.
†*Forfex hypuralis* Jordan: Jordan 1920b:568.
†*Forfex hypuralis* Jordan: Jordan 1921a:254, pl. 21b (restoration).

Type Specimen: †***Forfex hypuralis*** Jordan 1919, holotype, CAS 55400 (SU 105), left counterpart. †**Forficidae**.

Type Locality: Pine Cañon, near Santa Maria, formation and age not given, Santa Barbara County.

Referred Specimens: None.

Referred Specimens in Jordan (1920b): None. **Scomberesocidae**.

Referred Specimens in Jordan (1921a): None. Only discussed the holotype. †**Forficidae**.

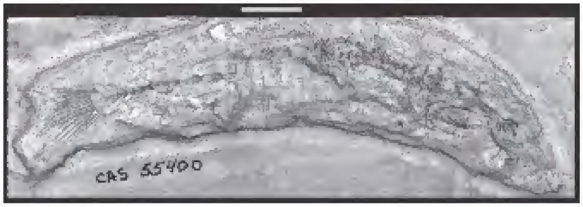


FIGURE 53. †*Forfex hypuralis* Jordan 1919, holotype, CAS 55400 (from color image provided by CAS); scale bar equals 1 cm.

Genus †*Zelotichthys* Jordan 1925

†*Zelotichthys alhambrae* (Jordan 1921a)

Figure 54

Selected Synonymy & References

†*Zelotes alhambrae* Jordan 1921a:254-255, pls. 12a, 26b (restoration).
†*Zelotichthys alhambrae* (Jordan): Jordan 1925:44.

Type Specimen: †*Zelotes alhambrae* Jordan 1921a, holotype, CAS 70041 (SU 236), left counterpart. †**Forficidae.**

Type Locality: Alhambra, "Shorb", [Jordan (1921a:254) did not give an exact age or formation, but he stated that the specimen was collected in "diatomaceous shale of the Monterey period" (= Miocene)], Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1925): None. Jordan (1925) noted that there was a mislabeling of figures in Jordan (1921a), plate 26a was intended for †*Zelosis hadleyi* and plate 26b for †*Zelotes alhambrae*.

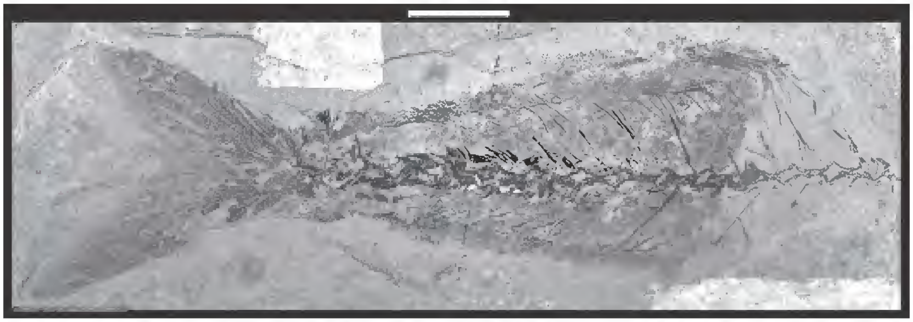


FIGURE 54. †*Zelotichthys alhambrae* (Jordan 1921a), holotype, CAS 70041 (from color image provided by CAS); scale bar equals 2 cm

Order **Cyprinodontiformes**

Suborder **Cyprinodontoidei**

Family **Fundulidae**

Genus ***Fundulus*** Lacepède 1803

†***Fundulus eulepis*** Miller 1945

Selected Synonymy & References

†*Fundulus eulepis* Miller 1945:319, fig. 2.
†*Fundulus eulepis* Miller: Smith 1981:table 2.

Type Specimen: †*Fundulus eulepis* Miller 1945, holotype, USNM 16883, whereabouts unknown. **Cyprinodontidae.**

Type Locality: Furnace Creek Formation, Late Miocene, near Furnace Creek Ranch, Inyo County.
Paratypes: USNM 16884 and 16885, presumably from the type locality.
Referred Specimens: LACM (CIT) locality 10245, two specimens on one slab, from the type locality of †***F. curryi,*** i.e. Titus Canyon Formation, Late Eocene, Inyo County.
Remarks: Because there is at least 25 Ma between the presence of the holotype and the referred specimen, it is unlikely the two specimens are the same species. Based on molecular evidence, ***Fundulus*** is included in the family **Fundulidae** (Nelson et al. 2004:218; Nelson 2006).

Fundulus sp.

Selected Synonymy & References
†***Parafundulus erdisi*** Jordan 1924:Uyeno and Miller 1962:523-524.
Fundulus **sp.**: Uyeno and Miller 1962:524.
Fundulus **sp.**: Smith 1981:table 2.
Fundulus **sp.**: Welton and Link 1982:209, table 2.

Locality: UCLA locality 4193, Posey Canyon Shale Member, Peace Valley Formation, Mio-Pliocene, Los Angeles County (see Remarks).
Referred Specimen in Uyeno and Miller (1962:524): They concluded that specimen CAS 55422 (SU 606 [= 506?]), partial right counterpart and a paratype of †***Parafundulus erdisi*** Jordan, is a species of ***Fundulus*** based on a photograph in Jordan 1924:plate J. See Remarks section for †***Empetrichthys erdisi***. **Cyprinodontidae**.
Referred Specimen in Smith (1981): None. **Cyprinodontidae**.
Remarks: Uyeno and Miller (1962) reported that UCLA locality 4193 was within the Posey Canyon Shale Formation and was of Middle-Upper Pliocene age. The Posey Canyon Shale Formation is now considered a member of the Peace Valley Formation (Link 1982:10). Welton and Link (1982:208) recognized the age of the Upper Peace Valley Formation as Hemphillian, a North American Land Mammal Age that extends from Middle-Late Miocene to earliest Pliocene (ca. 9.0-5.0 Ma) (Woodburne and Swisher 1995:fig. 7). Because the Posey Canyon Shale Member is located in the Upper Peace Valley Formation (Welton and Link 1982:fig. 2) and fossils diagnostic of its age are lacking (Link 1982:11), we follow Hall (2007:259) and recognize the age as Mio-Pliocene.

?***Fundulus*** Lacepède 1803

Selected Synonymy & References
? Cyprinodontidae: Pierce 1959:79, pls. 25-26.
Cyprinodontidae gen. and sp. undetermined.: Hubbs and Miller 1961:120.
? ***Fundulus***: Uyeno and Miller 1963, table 1.

Referred Specimens: Calico Mountains, formation not given, Middle or Late Miocene, San Bernardino County; two specimens in one siliceous nodule.
Referred Specimens in Uyeno and Miller (1963): refers to specimen in Pierce (1959). **Cyprinodontidae**.

Family **Goodeidae**

Genus ***Empetrichthys*** Gilbert 1893

†***Empetrichthys erdisi*** (Jordan 1924)

Figure 55

Selected Synonymy & References
†***Parafundulus erdisi*** Jordan 1924:45-47, pls. I, J.
†***Empetrichthys erdisi*** (Jordan): Uyeno and Miller 1962:520-532, fig. 1, table 1.
†***Empetrichthys erdisi*** (Jordan): Uyeno and Miller 1963:table 1.
†***Empetrichthys erdisi*** (Jordan): Smith 1981:172, table 2.
†***Empetrichthys erdisi*** (Jordan): Welton and Link 1982:208, fig. 3, table 2.

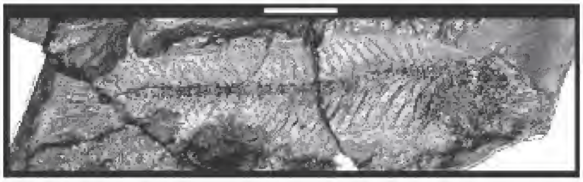


FIGURE 55. †*Empetrichthys erdisi* Jordan 1924, holotype, CAS 55432 (from color image provided by CAS), scale bar equals 1 cm.

Type Specimen: †***Parafundulus erdisi*** Jordan 1924, holotype, CAS 55432 (SU 605, 158), left counterpart. See Remarks section. **Cyprinodontidae.**

Type Locality: Confluence of Liebre and Piru Creeks, in Sec.3, T.6N., R.18W., in Santa Barbara National Forest, probably Posey Canyon Shale Member, Peace Valley Formation, Mio-Pliocene, Los Angeles County (see Remarks for ***Fundulus*** sp.).

Paratypes (= cotypes of Jordan): From type locality: CAS 55422 (SU 606), partial right counterpart; CAS 55431 (SU 607, 159), partial right counterpart. CAS 55422 is now considered a species of ***Fundulus*** (see Remarks section).

Referred Specimens in Uyeno and Miller (1962): From UCLA locality 4187, Posey Canyon Shale Member, Peace Valley Formation, Mio-Pliocene, Los Angeles County; 42 specimens, twelve of which are deposited in the University of Michigan Museum of Paleontology as UMMP 44626-44634) and the rest, UCLA 34990 and 34991 and 28 others, are supposed to be deposited in the Department of Geology, University of California, Los Angeles, but their whereabouts are unknown. (See Remarks for ***Fundulus*** sp.)

From UCLA locality 4193; (located near or at exactly the same site as the Type Locality): a single specimen, whereabouts unknown. **Cyprinodontidae.** (See Remarks for ***Fundulus*** sp.)

Referred Specimens in Uyeno and Miller (1963): None. **Cyprinodontidae.**

Referred Specimens in Smith (1981): None.

Referred Specimens in Welton and Link (1982: fig. 3): From UCLA locality 4187: UCLA 34990 and UCLA 34991, whereabouts of both specimens are unknown. **Cyprinodontidae.**

Remarks: According to Uyeno and Miller (1962:523-524), Jordan transposed the photographs so that plate J displays the type specimen CAS 55432 (SU 605, 158), not plate I, and paratype (= cotype of Jordan) CAS 55422 (SU 606) is figured on plate I. They state that the holotype and paratypes should have the numbers 505, 506, and 507, respectively, however the CAS catalogue uses the numbers 605-607. In addition, Uyeno and Miller identify the paratype CAS 55422 as a species of ***Fundulus***, based on the figures in Jordan. They were never able to locate either of the two paratypes in the Stanford University collection, however they now are housed in the CAS type collection. Based on molecular evidence, ***Empetrichthys*** is included in the **Goodeidae** (Nelson (2006:286).

Order **Stephanoberyciformes**

Family **Melamphaidae**

Genus ***Scopelogadus*** Vaillant 1888

†***Scopelogadus*** **(?)** ***capistranensis*** Ebeling 1962:1-6, text-fig. 1

Figure 56

Type Specimen: †***Scopelogadus*** **(?)** ***capistranensis*** Ebeling 1962, holotype, YPM 3965, complete articulated skeleton.

Type Locality: South of Capistrano Beach, Miocene, Orange County.

Paratype: YPM 3965A, complete articulated skeleton.

Remarks: Ebeling (1962) described the type "from Miocene shales along the sea cliff south of Capistrano Beach in Orange County, California." No other locality data were provided.

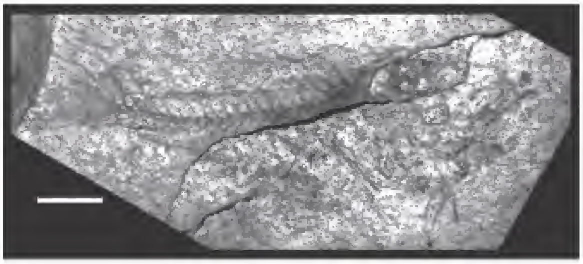


FIGURE 56 †*Scopelogadus* (?) *capistranensis* Ebeling 1962, holotype, YPM 3965 (courtesy of Division of Vertebrate Paleontology, Peabody Museum of Natural History, Yale University, New Haven, CT, USA); scale bar equals 5 mm.

Melamphaidae genus and species indeterminate

Referred Specimens in Fitch and Lavenberg (1968:94): The authors mention that an "imprint" of a fossil melamphaid was found in Miocene strata in Orange County (presumably †***Scopelogadus*** **(?)** ***capistranensis***), and fossil otoliths of melamphaids have been found in several Miocene, Pliocene, and Pleistocene deposits in southern California.

Order **Gasterosteiformes**
Suborder **Gasterosteoidei**
Family **Gasterosteidae**
Genus ***Gasterosteus*** Linnaeus 1758
Gasterosteus aculeatus Linnaeus 1758

Selected Synonymy & References (fossils only)

†***Pungitius haynesi*** David 1945:315, text-fig. 1: Bell 1973a:588.
Gasterosteus aculeatus Linnaeus 1758:295.
Gasterosteus aculeatus Linnaeus: Bell 1973a:588, text-fig. 1.
Gasterosteus aculeatus Linnaeus: Bell 1973b:479-483, text-figs. 1-3.
Gasterosteus aculeatus Linnaeus: Rawlinson and Bell 1977:586.
Gasterosteus aculetus aculeatus Linnaeus: Bell 1977:279, text-fig. 1.
†***Gasterosteus abnormis*** Sytchevskaya and Gretchina 1981:71-80:Bell 1994:446, table 15.1.
†***Gasterosteus orientalis*** Sytchevskaya and Gretchina 1981:71-80: Bell 1994:444, table 15.1.
Gasterosteus aculeatus Linnaeus: Smith 1981:table 2.
Gasterosteus aculeatus Linnaeus: Welton and Link 1982:208, table 2.
Gasterosteus aculeatus Linnaeus: Bell 1994:440-444, table 15.1.
Gasterosteus aculeatus Linnaeus: Bell et al. 2009:text fig. 1B.

Type Specimen: Extant, ***Gasterosteus aculeatus*** Linnaeus 1758, syntypes (skins) housed in the Zoological Society of London (Eschmeyer (1998:34).

Type locality: Europe.

Referred Specimens and Holotype for †*Pungitius haynesi* David: LACM (CIT) locality 389, near Piru Creek, Ridge Formation, Middle Pliocene, Ventura County; holotype, LACM (CIT) 10347, right counterpart. Bell (1973a) also examined a poorly preserved specimen, LACM 28351, from the type locality of †***Pungitius haynesi***. **Gasterosteidae.**

Referred Specimens in Bell (1973b): From LACM locality 1653 (reported by Bell as LAV 1653), Soboda Indian Reservation, Bautista Formation, Plio-Pleistocene, Riverside County; LACM 27570 (text-fig. 3a), 27572-27573, 27574 (text-fig. 1), 27575-27585, 27586 (text-fig. 2) and UCR 4047/4-4047/21. The assemblage consists of four articulated skeletons and associated elements of one or more individuals on 30 slabs, 20 of which have counterparts.

Referred Specimens in Bell (1977): From LACM (CIT) locality 3897, Lompoc, Late Miocene, Monterey Formation, Santa Barbara County; LACM (CIT) 64577, part and counterpart. **Gasterosteidae**.

Referred Spcimens and Holotype of †***G. abnormis*** in Sytchevskaya and Gretchina (1981): From Sakhalin Island, Agnevo Formation Middle Miocene, Russia: holotype, PIN 3181/101, complete left counterpart. **Gasterosteidae**.

Referred Spcimens and Holotype of †***G. orientalis*** in Sytchevskaya and Gretchina (1981): From Kamchatka, Berezov Formation, Middle Miocene, Russia: holotype, PIN 3844/1, complete right counterpart,. **Gasterosteidae**.

Referred Specimens in Bell et al. (2009): From LACM locality 1834, Palos Verdes, probably from the Altamira Shale Member of the Monterey Formation, Middle Miocene, Los Angeles County; LACM 150177, right counterpart, and specimen LACM (CIT) 64577, listed above under Bell (1977). **Gasterosteidae**.

Remarks: Bell (1973:588) placed the locality for †***Pungitius haynesi*** in Los Angeles County rather than Ventura County as reported by David (1943). Welton and Link (1982:208) stated that LACM (CIT) locality 389 occurs within the Osito Canyon Shale Member of the Peace Valley Formation, Late Miocene, Los Angeles County.

Distribution of Neogene ***G. aculeatus*** within California (other than above): Bell (1994: table 15.1) cited Fierstine (misspelled as Fierstein) et al. unpublished data): near Paso Robles, San Luis Obispo County, Paso Robles Formation, Plio-Pleistocene.

Distribution of Neogene ***G. aculeatus*** outside of California: Bell (1994: table 15.1) cited the following: Bell (unpublished data and 1974) west central Nevada, mid-Late Miocene; Gaudant (1979, 1981) Netherlands, Plio-Pleistocene; Sytchevskaya and Gretchina (1981:71-80) Sakhalin Island, Russia, Middle Miocene and Kamchatka, Russia, Middle Miocene.

Gasterosteus* cf. *G. aculeatus Linneaus 1758

Referred Specimens of ***G.* cf. *G. aculeatus*** in Casteel and Rymer (1975: 620-621, Figs. 2B, C: From USGS vertebrate locality M-1239, Cache Formation, Plio-Pleistocene, near Lower Lake, Lake County; USNM 184073, partial right lateral scute (fig. 2B); USNM 184074, partial scute (fig. 2C).

***Gasterosteus* sp.**

Selected Synonymy & References

Gasterosteidae sp. undetermined.: Reynolds 1991:89
Gasterosteidae sp. undetermined: Bell 1994:table 15.1
***Gasterosteus* sp.**: Bell 1994:441
***Gasterosteus* sp.**: Bell and Reynolds 2010:164, 168, fig. 2, appendix

Referred Specimen in Reynolds (1991): From SBCM locality 1.76.43, Middle Miocene, Toomey Hills, San Bernardino County; pelvic spine.

Referred Specimens in Bell and Reynolds (2010:164, 168, fig. 2, appendix): From SBCM locality 1.76.43, Argonaut site, Toomey Hills, Middle Miocene, San Bernardino County; SBCM L1814-1012, probable stickleback spine; L1814-1013, possible left pelvic or median spine; L1814-1014, left pelvic spine; L1814-1015, left pelvic spine; L1814-1016, median spine base; 1814-1017, badly worn spine.

Suborder **Syngnathoidei**

Family **Syngnathidae**
Subfamily †**Hipposyngnathinae**

Figure 57

Genus †***Hipposyngnathus*** Danil'chenko 1960
†***Hipposyngnathus imporcitor*** Fritzsche 1980

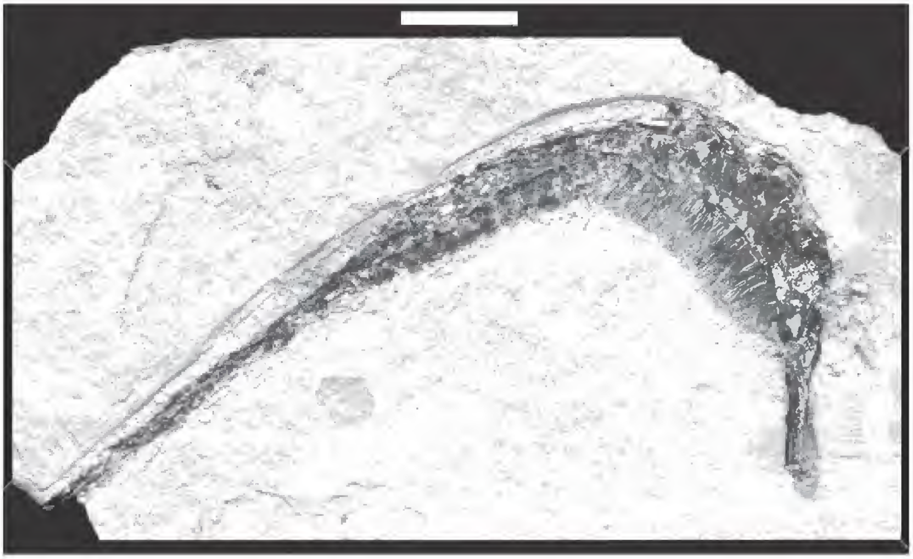


FIGURE 57. †*Hipposyngnathus imporcitor* Fritzche 1980, holotype, LACM 12055 (from color image provided by LACM); scale bar equals 2 cm.

Selected Synonymy & References

†*Syngnathus avus* Jordan and Gilbert 1919a:34-35: David 1943:70-71 (in part).
†*Hipposyngnathus imporcitor* Fritzsche 1980:217.

Type Specimen: †***Hipposyngnathus imporcitor*** Fritzsche 1980, holotype, LACM 12055, nearly complete left counterpart.

Type Locality: LACM (CIT) locality 326, Santa Monica Mountains, Upper Modelo Formation, Late Miocene, Los Angeles County.

Referred Specimens in Fritzsche (1980): From LACM (CIT) locality 326, Santa Monica Mountains, Upper Modelo Formation, Late Miocene, Los Angeles County; LACM 10060, left and right counterparts; 10061, left and right counterparts; 10063, partial left and right counterparts; 10114, left counterpart; 10134, left counterpart; 10143, right counterpart; 10145, partial left and right counterparts; 12054, counterpart; 25341, partial counterpart; 25342, counterpart; 25343, counterpart; 25344, partial counterpart; 25345, counterpart; 25346, partial counterpart; 25347, counterpart, 25348, counterpart, 25349, counterpart, 25350, counterpat, 25351, counterpart.

From LACM locality 1267, Santa Monica Mountains, Upper Modelo Formation, Late Miocene, Los Angeles County; LACM 13362, counterpart; 13363, counterpart; 13364, counterpart; 13365, counterpart, 13366, counterpart; 13367, left and right counterparts; 13368, counterpart; 13369, counterpart; 13370, counterpart; 13371 counterpart; 13372, counterpart; -3373, counterpart; 13451, counterpart; 13452, counterpart; 13453, counterpart; 13454, counterpart; 13455, counterpart; 13456, counterpart; 13457, counterpart; 13458, counterpart; 13459, counterpart; 13460, counterpart; 13461, counterpart; 13462, counterpart; 13463, counterpart; 13464, counterpart; 13465, counterpart; 13469, counterpart; 13470, counterpart; 13471, counterpart; 13472, counterpart; 13473, counterpart; 13475, counterpart; 13477, counterpart; 13478, counterpart; 25789, partial counterparts; 25790, partial counterpart; 25791, counterpart.

From LACM locality 6589, near Lompoc, Monterey Formation, Late Miocene: LACM 12160, counterpart; 12161, counterpart; 12162, counterpart; 12163, counterpart; 12164, counterpart; 12165, counterpart, 12166, counterpart; 12167, counterpart, 12168, counterpart; 12169, counterpart.

From LACM localities 1031 and 1033, near Emory Park, Alhambra, Modelo Formation, Late Miocene, Los Angeles County; LACM 1056, partial counterpart; 1057, partial counterpart; 1058, partial counterpart; 1349, partial countrpart; 12459, counterpart; 12460, counterpart; 12462, counterpart; 12463, counterpart; 12464, counterpart; 25668, counterpart.

From LACM (CIT) locality 329, Dixie Canyon, Upper Modelo Formation, Late Miocene, Santa Barbara County; LACM 25357, left and right counterparts; 25358, counterpart; 25359, counterpart; 25363, counterpart; 25364, counterpart; 25365, counterpart. **Syngnathidae.**

Referred Specimens of †***S. avus*** in David (1943) that were reidentified as †***H. imporcitor*** by Fritzsche (1980): From LACM (CIT) locality 326: Santa Monica Mountains, Upper Modelo Formation, Late Miocene, Los Angeles County; LACM 10060, left and right counterparts; 10061, left and right counterparts; 10114, left counterpart; 10143, right counterpart; 10145, partial left and right counterparts. **Syngnathidae.**

Remarks: According to Fritzche (1980:217), LACM locality 1033 is in the same area as LACM locality 1031, however, the LACM Locality Catalog lists LACM locality 1033 as Monterey Formation, Late Miocene, El Modena, Orange County.

Genus *Syngnathus* Linnaeus 1758

†***Syngnathus emeritus*** Fritzsche 1980

Figure 58

Type Specimen: †***Syngnathus emeritus*** Fritzsche 1980, holotype, LACM 27445, right and left counterparts.

Type Locality: LACM locality 7153, near San Dimas, Puente Formation, Late Miocene, Los Angeles County.

Referred Specimens: From LACM localities 7046 and 7153, near San Dimas, Puente Formation, Late Miocene, Los Angeles County; LACM 26146, partial counterpart; 26147, counterpart; 26148, counterpart; 27431, counterpart, 27432, counterpart; 27433, counterpart; 27434, counterpart; 27437, counterpart; 27438, counterpart; 27439, counterpart; 27440, counterpart; 27446, counterpart; 27447, counterpart; 27448, counterpart. **Syngnathidae.**

Remarks: LACM locality 7153 was originally given as LACM locality 5153, but was a typographical error.

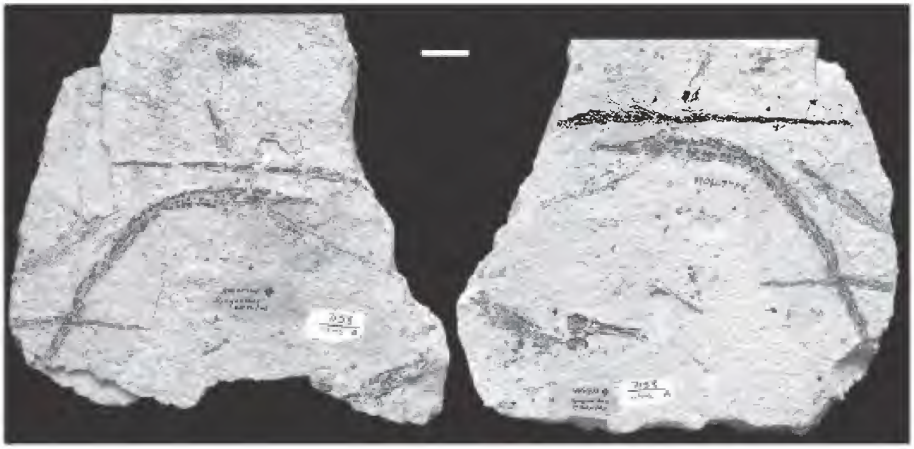


FIGURE 58. †*Syngnathus emeritus* Fritzsche 1980, holotype, LACM 27445 (from color image provided by LACM); scale bar equals 2 cm.

†***Syngnathus avus*** Jordan and Gilbert 1919a

Figure 59

Selected Synonymy & References

†***Syngnathus avus***: Jordan and Gilbert 1919a:34, pl. 29, fig. 2.
†***Syngnathus avus***: Jordan and Gilbert: Jordan 1921a:259, pl. 28b (restoration).

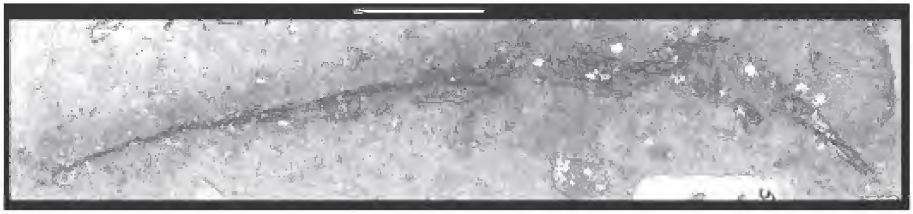


FIGURE 59. †*Syngnathus avus* Jordan and Gilbert 1919a, holotype, CAS 58372 (from color image provided by CAS); scale bar equals 2 cm.

†***Syngnathus avus***: Jordan and Gilbert: Duncker 1923:238.
†***Syngnathus avus***: Jordan and Gilbert: Jordan 1927b:191.
†***Syngnathus californiensis avus***: (Jordan and Gilbert): Herald 1941:69.
†***Syngnathus avus***: Jordan and Gilbert: David 1943:70-73, pl. 9, fig. 6, pl. 10, figs. 1, 2.
†***Syngnathus avus*** Jordan and Gilbert: Fritzsche 1980:219, text-fig. 15B.

Type Specimen: †***Syngnathus avus***: Jordan and Gilbert 1919a, holotype, CAS 58372 (SU 46, 41 and B in table of original description), left counterpart. **Syngnathidae.**

Type Locality: UCMP locality V3525, near South Pasadena (Bairdstown), Monterey Formation, Late Miocene, Los Angeles County.

Paratypes: CAS 58373 (SU 5, 115 and A in table of original description), partial right counterpart and CAS 58374 (SU 115A and C in table of original description), counterpart.

Referred Specimens in Jordan and Gilbert (1919a): Mentioned a total of 12 more or less complete specimens, but no individual numbers other than the holotype and paratypes.

Referred Specimens in Jordan (1921a): None. **Syngnathidae.**

Referred Specimens in Jordan (1927b): None. **Syngnathidae.**

Referred Specimens of *S. avus* in Herald (1941): None. He could locate only the holotype and paratypes in the SU collection. **Syngnathidae.**

Referred Specimens of *S. avus* in David (1943): From LACM (CIT) locality 326, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; 8 complete counterparts, LACM 10060, left and right counterparts; 10061, left and right counterparts; 10114, left counterpart; 10143, right counterpart; 10144, right counterpart; 10145, left and right counterparts.

From LACM (CIT) locality 329, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM 10134 (pl. 10, fig. 1), right counterpart (see Remarks).

From LACM (CIT) 326 or nearby: several specimens in the R. W. Frazier collection, numbers 82-86 and 89-91, whereabouts unknown.

From LACM locality 1031, near Emory Park, Alhambra, Modelo Formation, Late Miocene, Los Angeles County; LACM 1056, partial counterpart; 1057, partial counterpart; 1058, partial counterpart; plus uncatalogued fragments.

From LACM locality 1033?, El Modena, Monterey Formation, Late Miocene, Orange County; LACM 129, a counterpart and numerous fragments, whereabouts unknown (see Remarks).

From UCMP locality V3112, Gaviota Canyon, Monterey Formation, Late Miocene, Santa Barbara County; UCMP 29528, counterpart; 29529, counterpart; 32756, counterpart; 32757, counterpart; 32758, counterpart; 32759, right counterpart; 32760, counterpart; 32761, counterpart; 32762, counterpart; 32763, counterpart (see pl. 9, fig. 6 for illustration of UCMP 32759).

From LACM (CIT) locality 334B, Santa Monica Mountains, lower Modelo Formation, Late Miocene, Los Angeles County; uncatalogued partial counterparts.

From UCMP locality V3430A: uncatalogued partial counterparts.

From Alhambra, Los Angeles County, Modelo Formation, Late Miocene: CAS 55408 (SU 33, 34, and 37), three partial counterparts.

From Bear Canyon, Santa Ynez Mountains, Santa Barbara County; SBMNH 117, left counterpart (pl. 10, fig. 2). **Syngnathidae.**

Referred Specimens in Fritzsche (1980): From LACM locality 1681, Santa Monica Mountains, Lower Modelo Formation, Late Miocene Los Angeles County; LACM 11598, counterpart; 11599 counterpart; 11600, counterpart; 11601, counterpart; 11602, counterpart; 11603, counterpart; 11604, counterpart; 11605, counterpart; 26438, counterpart; 26439, counterpart; 26440, counterpart; 26441, counterpart; 26442, counterpart; 26443, counterpart; 26444, counterpart. **Syngnathidae**.

Remarks: According to Jordan (1927b:191), the only figure (Plate 29, fig. 2) of †***S. avus*** in the type description was a photo of an Austrian specimen, †***S. helmsi*** Steindachner (1860). Fritzche (1980:219) mistakenly gave the wrong specimen number (SU 44 rather than SU46) for the holotype. David (1943:70) mislabeled LACM 10134 as 10334, however the specimen is correctly labeled in the legend of Plate 10, fig. 1. Specimen LACM 129 is listed in the LACM database as a bird from the Rancholabrean of New Mexico [email from Vanessa Rhue (LACM) dated 6, 2011], there the whereabouts of the specimen listed by David (1943) is unknown.

***Syngnathus* sp.**: David 1944:30, pl. 1, figs. 1, 1a

Referred Specimens: From Ohio Oil Company "K.C.L.-G." well number 1, Fruitvale District, Early-Middle Miocene, Kern County; head (pl. 1, fig. 1), whereabouts unknown.

From Texas Company Pioneer Unit Plan well number 1, Sunset Distritct, Early-Middle Miocene, Kern County; opercle (pl. 1, fig. 1a), whereabouts unknown.

Order **Scorpaeniformes**
Suborder **Scorpaenoidei**
Family **Scorpaenidae**
Subfamily **Sebastinae**
Genus ***Sebastes*** Cuvier 1829
†***Sebastes apostates*** (Jordan 1920b)

Figure 60

Selected Synonymy & References

†***Sebastoessus apostates*** Jordan 1920b:571.
†***Sebastoessus apostates*** Jordan: Jordan 1921a:285, pls. 14a, 53 (restoration).
†***Sebastoessus apostates*** Jordan: Jordan 1925:36-37.
†***Sebastodes* (*Sebastoessus*) *apostates*** (Jordan): David 1943:162, text-fig. 35b.
†***Sebastes* (*Sebastodes*) *apostates*** (Jordan): Barsukov 1989:84, pl. 6 figs. A and B, table 4.
†***Sebastes* (*Sebastodes*) *apostates*** (Jordan): Barsukov 1990:64.
†***Sebastes apostates*** (Jordan): Schultz 1993:fig. 7/47.
†***Sebastes apostates*** (Jordan): Love et al. 2002:13.

Type Specimen: †***Sebastoessus apostates*** Jordan 1920b, holotype, CAS 55536 (SU 368, 70), left counterpart. **Scorpaenidae**.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratypes assigned by Barsukov (1989): Right and left counterparts CAS 55532 (SU 633A, 71), left, and CAS 55499 (SU 633, 73), right. See Remarks.

Referred Specimens in Jordan (1921a): None. **Scorpaenidae**.

Referred Specimens in Jordan 1925: From type locality: CAS 55532 (SU 633 and its counterpart 633A, 71); CAS 55621 (SU 697, 67), right counterpart; three specimens whereabouts unknown, SU 634, 661, and 670. **Scorpaenidae**.

Referred Specimens in David (1943): From type locality: counterparts CAS 55532 (633A, 71), CAS 55499 (SU 633,73) and CAS 55501 (SU 636, 72), partial left counterpart. See Remarks. **Scorpaenidae**.

Referred Specimens in Barsukov (1989, 1990): None. **Scorpaenidae**.

Referred Specimens in Love et al. 2002: None. **Sebastidae**.

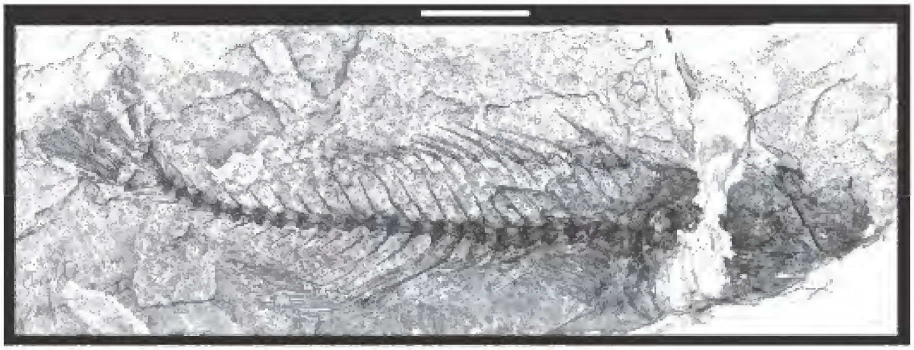


FIGURE 60. †*Sebastes apostates* (Jordan 1920b), holotype, CAS 55536 (from color image provided by CAS); scale bar equals 5 cm.

Remarks: Both David (1943) and Barsukov (1989) gave Jordan (1921a) as the author, however Jordan (1920b) (Genera of Fishes, Part IV, p. 571), gave a brief description of †*S. apostates* prior to a more complete description in 1921.

According to Jordan (1925:36) specimens SU 633 and 633A are counterparts of the same specimen, however the CAS catalog gives each counterpart a different number (CAS 55532 for SU 633A and 55499 for SU 633).

†*Sebastes davidi* Barsukov 1989

Figure 61

Selected Synonymy & References

†***Sebastoessus apostates*** Jordan 1920b: Jordan 1925:36 (in part): Barsukov 1989:80.
†***Sebastodes* (*Sebastinus*) *ineziae*** (Jordan *in* Jordan and Gilbert 1920): David 1943:158, text-fig. 34b.
†***Sebastes* (*Sebastodes*) *davidi*** Barsukov 1989:80, pl. 4A.
†***Sebastes davidi*** Barsukov 1989: Schultz 1993:135, fig. 7/60.
†***Sebastes davidi*** Barsukov 1989: Love et al. 2002:13.

Type Specimen: †***Sebastoessus apostates*** Jordan 1920b, holotype, CAS 55621 (SU 697, 67), right counterpart.
Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.
Referred Specimens: None

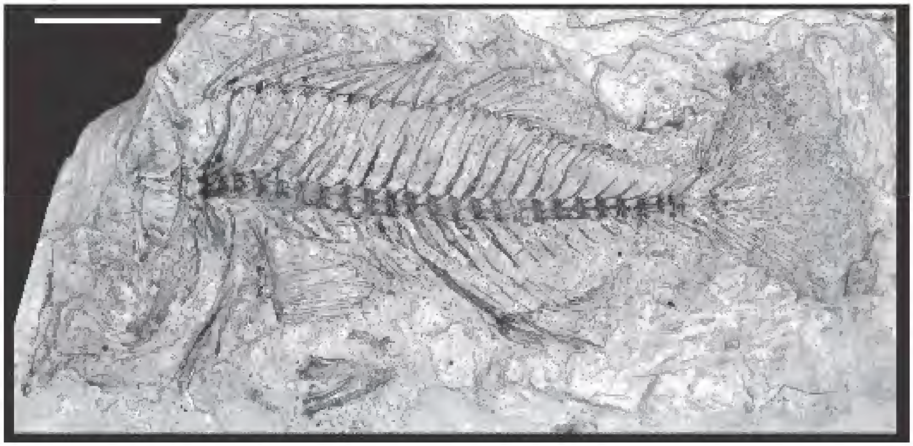


FIGURE 61. †*Sebastes davidi* Barsukov 1989, holotype, CAS 55621 (from color image provided by CAS); scale bar equals 5 cm.

Referred Specimens of †*S. apostates* in Jordan (1925) and David (1943) that were reidentified as †*S. davidi* by Bannikov (1989): CAS 55621 (SU 697, 67), right counterpart, the holotype of †*S. davidi*. **Scorpaenidae.**

Referred Specimens of †*S. apostates* in Schultz (1993): None. Scorpaenidae.

Referred Specimens in Love et al. (2002): None. Sebastidae.

†*Sebastes defunctus* Barsukov 1989

Figure 62

Selected Synonymy & References

†***Sebastinus ineziae*** (Jordan *in* Jordan and Gilbert 1920): Jordan 1925:38, pl. 19.
†***Sebastodes (Sebastinus) ineziae*** (Jordan)(in part): David 1943:158, text-fig. 34a.
†***Sebastes (Sebastodes) defunctus*** Barsukov 1989:78, pl. 3C.
†***Sebastes defunctus*** Barsukov: Schultz 1993:135, fig. 7/43.
†***Sebastes defunctus*** Barsukov: Love et al. 2002:13.

Type Specimen: †***Sebastinus ineziae*** (Jordan *in* Jordan and Gilbert 1920), holotype, CAS 55542 (SU 549, 64), right counterpart. **Scorpaenidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratype: CAS 55491 (SU 65), partial right counterpart.

Referred Specimens: None.

Referred Specimens of †*S. ineziae* in Jordan (1925) and David (1943) that were reidentified as †*S. defunctus* by Barsukov (1989): Only the holotype [CAS 55542 (SU 549, 64)] and paratype [CAS 55491 (SU 65)]. **Scorpaenidae.**

Referred Specimens of †*S. defunctus* in Schultz (1993): None. **Scorpaenidae.**

Referred Specimens of †*S. defunctus* in Love et al. (2002): None. Sebastidae.

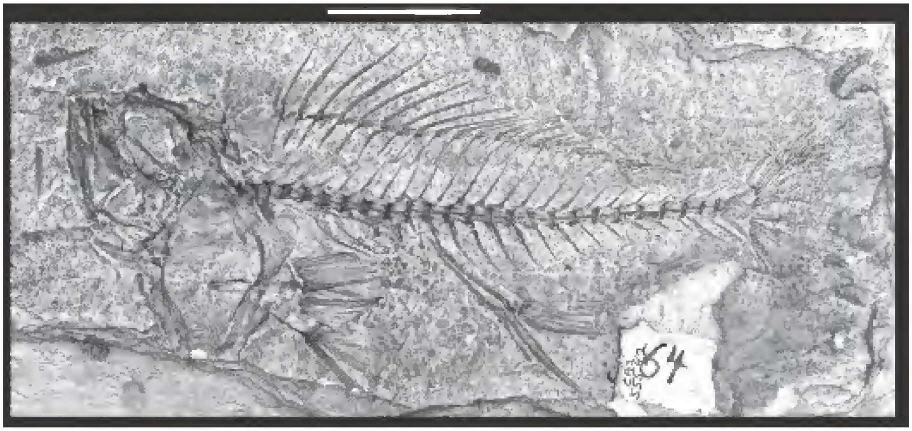


FIGURE 62. †***Sebastes defunctus*** Barsukov 1989, holotype, CAS 55542 (from color image provided by CAS); scale bar equals 5 cm.

Sebastes goodei (Eigenmann and Eigenmann 1890)

Selected Synonymy & References

Sebastodes goodei Eigenmann and Eigenmann 1890:12
Sebastodes goodei Eigenmann and Eigenmann: Fitch 1967:14.
Sebastodes goodei Eigenmann and Eigenmann: Fitch 1968:16.
Sebastes goodei (Eigenmann and Eigenmann): Nolf 1985:76.

Type Specimen: Extant, ***Sebastodes goodei*** Eigenmann and Eigenmann, syntypes BMNH 1891.5.19.28 and others (Eschmeyer 1998:660).

Type Locality: Point Loma, California.

Referred Specimens in Fitch (1967:14): Otoliths of ***S. goodei*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:16): Same information as Fitch (1967) in entry above.

Referred Specimens in Nolf (1985:76): Cites Fitch (1967) that otoliths are recovered from Pliocene deposits in California.

Remarks: Because Fitch (1967, 1968) did not give any specific fossil locality containing otoliths of ***S. goodei***, its presence in the Neogene of California is questionable.

†*Sebastes ineziae* (Jordan *in* Jordan and Gilbert 1920)

Figure 63

Selected Synonymy & References

†***Rixator ineziae*** Jordan *in* Jordan and Gilbert 1920:34-35, pl. 22, 23 fig. 2.
†***Sebastinus ineziae*** (Jordan): Jordan 1920b:571.
†***Rixator porteousi*** (Jordan and Gilbert 1920: 33-34 [in part]: Jordan 1921a:287.
†***Sebastinus ineziae*** (Jordan): Jordan 1921a:287-288, pl. 54.
†***Sebastinus ineziae*** (Jordan): Jordan 1925:37-38, pl. 19.
†***Sebastodes (Sebastinus) ineziae*** (Jordan): David 1943:158-159, text-fig. 34a, b, pl. 16 fig. 1.
?†***Sebastodes (Sebastinus) ineziae*** (Jordan): David 1943:158-159, pl. 16 fig. 1.
†***Sebastes (Sebastodes) ineziae*** (Jordan): Barsukov 1989:76-78, table 1, pl. 3A, B.
†***Sebastes ineziae*** (Jordan): Barsukov 1990:64, table 5.
†***Sebastes ineziae*** (Jordan): Schultz 1993: 135, fig. 7/49.
†***Sebastes ineziae*** (Jordan): Love et al. 2002:13.

Type Specimen: †***Rixator ineziae*** Jordan *in* Jordan and Gilbert 1920, holotype, CAS 55577 (SU 145B, 60), left headless counterpart and its right counterpart SU 145A. **Scorpaenidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratype: assigned by Barsukov (1989): CAS 55489 (SU 243, 62), partial right counterpart. Barsukov gave the specimen number as 55481, but the CAS catalogue lists specimen SU 243 (62) as number 55489.

Referred Specimens in Jordan *in* Jordan and Gilbert (1920): All from same general locality as holotype: CAS 55528 (SU 341, 57), partial left counterpart; four specimens with whereabouts unknown, SU 76, 141, 310, and 323. **Scorpaenidae.**

Referred Specimens in (Jordan 1921a): All from same general locality as holotype: two specimens originally identified as †***R. porteousi*** by Jordan and Gilbert (1920): CAS 55489 (SU 243, 62), partial right counter-

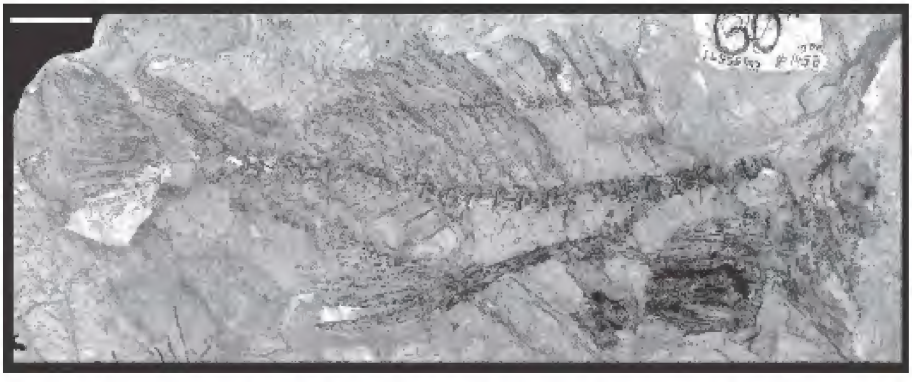


FIGURE 63. †*Sebastes ineziae* (Jordan *in* Jordan and Gilbert 1920), holotype, CAS 55577 (from color image provided by CAS); scale bar equals 2 cm.

part and 55523 (246), left counterpart; and two specimens referred for the first time to †***S. ineziae***, CAS 55542 (SU 549), right counterpart; SU 542 (whereabouts unknown). **Scorpaenidae.**

Referred Specimens in Jordan (1925): All from the general area of the type locality: CAS 55542 (SU 549), right counterpart; 55648 (SU 659, 58), right counterpart; 55515, partial left counterpart; and two specimens with whereabouts unknown, SU 658 and 660. **Scorpaenidae.**

Referred Specimens in David (1943): All from general area of the type locality: CAS 55503 (SU 61, 88), partial left counterpart; 55489 (SU 243, 62), partial right counterpart; CAS 55542 (SU 549, 64), right counterpart; 55491 (SU 65), partial right counterpart; 55515 (SU 671, 66), partial left counterpart; 55621 (SU 697, 67), right counterpart; four specimens with whereabouts unknown, SU 68 and 69, USC 104, and an uncatalogued right counterpart (pl. 16 fig. 1). **Scorpaenidae.**

Referred Specimens in Barsukov (1989, 1990): None. **Scorpaenidae.**

Referred Specimens in Schultz (1993): None. **Scorpaenidae.**

Referred Speimens in Love et al. (2002): None. **Sebastidae.**

Remarks: Barsukov (1989) reidentified specimens CAS 55542 and 55491 as the holotype and paratype of †***S. defunctus***, respectively, CAS 55503 as a paratype of †***S. porteousi***, and CAS 55528 and 55648 as the holotype and a paratype of †***S. velox***, respectively. Jordan (1920c) listed the holotype of †***Sebastinus ineziae*** as number SU 45B in the text, but SU 145B in the figure legend for plate 23, fig. 2. Also, the legend for plate 22 identified specimen (SU 243) as †***Rixator ineziae*** (Jordan and Gilbert), but according to the text on page 33, SU 243 is †***Rixator porteousi*** Jordan and Gilbert.

†*Sebastes longirostris* Barsukov 1989

Figure 64

Selected Synonymy & References

†***Sebastinus ineziae*** (Jordan 1920c): Jordan 1925:37.
†***Sebastes (Sebastinus) ineziae*** (Jordan): David 1943:158.
†***Sebastes (Sebastinus) longirostris*** Barsukov 1989:81, fig. 4c (restoration).
†***Sebastinus longirostris*** Barsukov: Schultz 1993: 136, fig. 7/44.
†***Sebastinus longirostris*** Barsukov: Love et al. 2002:13.

Type Specimen: †***Sebastinus ineziae*** (Jordan 1920c), holotype, CAS 55515 (SU 671, 66), incomplete left counterpart. **Scorpaenidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratype: None.

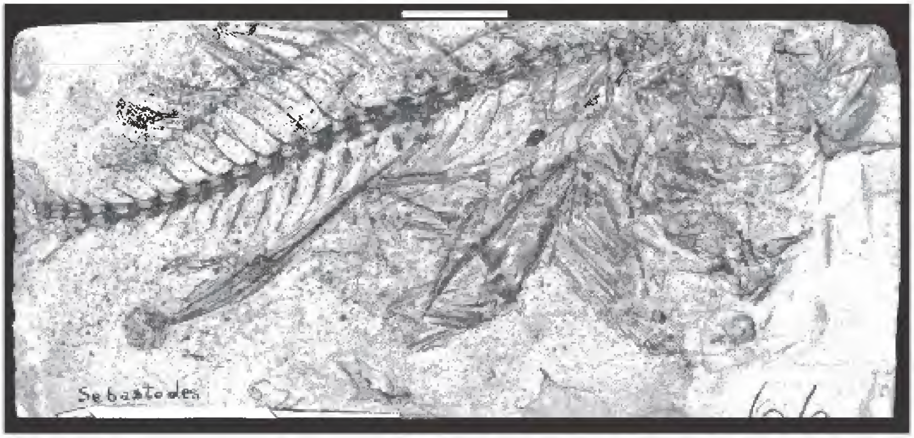


FIGURE 64. †*Sebastes longirostris* Barsukov 1989, holotype, CAS 55515 (from color image provided by CAS); scale bar equals 3 cm.

Referred Specimens: None.

Referred Specimens of †*S. ineziae* in Jordan (1925) and David (1943) that were reidentified by Barsukov (1989) as †*S. longirostris*: Only the holotype [CAS 55515 (SU 671, 66)].

Referred Specimens in Schultz (1993): None. **Scorpaenidae.**

Referred Specimens in Love et al. (2002): None. **Sebastidae.**

†*Sebastes porteousi* (Jordan and Gilbert 1920)

Figure 65

Selected Synonymy & References

†***Rixator porteousi*** Jordan and Gilbert 1920:31-34, pls. 21, 23 fig. 1.
†***Rixator porteousi*** Jordan and Gilbert: Jordan 1920b:571.
†***Rixator porteousi*** Jordan and Gilbert: Jordan 1921a:285, pl.52 (restoration).
†***Rixator porteousi*** Jordan and Gilbert: Jordan 1925:38-39: David 1943:160.
†***Sebastodes (Rixator) porteousi*** (Jordan and Gilbert): David 1943: 41-42, 160-161, text-fig. 35a.
†***Rixator ineziae*** Jordan 1920c [in part]: David 1943:160.
†***Sebastinus ineziae*** (Jordan 1920c) [in part]: Jordan 1921a.
†***Sebastodes (Sebastinus) ineziae*** (Jordan 1920c) [in part]: David 1943:158.
†***Sebastoessus haroldi*** Jordan 1925:37: Barsukov 1989:85.
†***Sebastes (Sebastodes) porteousi*** (Jordan and Gilbert): Barsukov 1989:85-86. pl. 7 figs. A, B.
†***Sebastes porteousi*** (Jordan and Gilbert): Barsukov 1990:64, tables 3-6.
†***Sebastes porteousi*** (Jordan and Gilbert): Schultz 1993:135-136, figs. 7/38, 7/39.
†***Sebastes porteousi*** (Jordan and Gilbert): Love et al. 2002:13.

Type Specimen: †***Rixator porteousi*** Jordan and Gilbert 1920, holotype, CAS 55598 (SU 300, 56), nearly complete right counterpart. Figured in David (1943:text-fig. 35a) and in Barsukov [1989:pl. 7B (restoration)]. **Scorpaenidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratype assigned by Barsukov (1989): CAS 55503 (SU 88, 61), partial left counterpart.

Referred Specimens of †*S. porteousi* in Jordan and Gilbert (1920): CAS 55489 (SU 243, 62), partial right counterpart; CAS 55523 (SU 246, 63), left counterpart. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in Jordan (1921a): None. Only mentions holotype CAS 55598 (SU 300, 56). **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in Jordan (1925): CAS 55484 (SU 637, 51), partial right counterpart; SU 655 (whereabouts unknown). **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in David (1943:41): From LACM (CIT) locality 317, Santa Monica

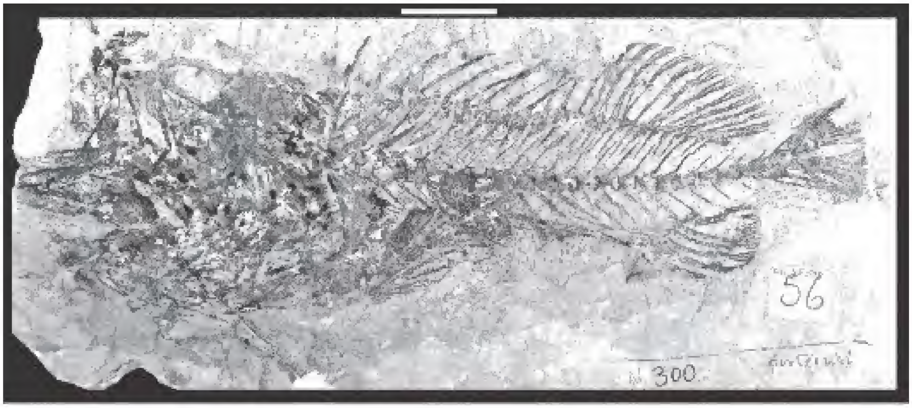


FIGURE 65. †*Sebastes porteousi* (Jordan and Gilbert 1920), holotype, CAS 55598 (from color image provided by CAS); scale bar equals 5 cm.

Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10219, left counterpart.

From LACM (CIT) locality 334, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10038, left counterpart. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in David (1943:160): From the type locality at Lompoc: LACM (CIT) 10218, right counterpart; CAS 55528 (SU 341, 57), left counterpart; CAS 55648 (SU58, 659), right counterpart; CAS 55588 (SU 59, 600), left counterpart; two uncatalogued specimens. David listed ***†S. haroldi*** in the synonymy of ***†S. porteousi***, but there was no mention of it in her description. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in Barsukov (1989): Holotype of ***†Sebastoessus haroldi*** Jordan, CAS 55523 (SU 246, 63), left counterpart. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in Barsukov (1990): None. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in Schultz (1993): None. Recognizes that ***†S. haroldi*** is a synonym of ***†S. porteousi***. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in Love et al. (2002): None. **Sebastidae**

Remarks: see remarks under ***†S. ineziae***.

†Sebastes thermophilus Barsukov 1989

Figure 66

Selected Synonymy & References

†Sebastodes (Rixator) porteousi (Jordan and Gilbert 1920) [in part]: David 1943:160.
†Sebastodes (Sebastoëssus) apostates (Jordan 1920b) [in part]: David 1943:162.
†Sebastes (Sebastodes) thermophilus Barsukov 1989:81, pl. 5A.
†Sebastes thermophilus Barsukov: Schultz 1993:136, fig. 7/46.
†Sebastes thermophilus Barsukov: Love et al. 2002:13.

Type Specimen: ***†Sebastodes (Rixator) porteousi*** (Jordan and Gilbert 1920) [in part]: David 1943: holotype, CAS 55501 (SU 636, 72), nearly complete left counterpart **Scorpaenidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratype: CAS 55588 (SU 600, 59), left counterpart, figured in Barsukov, pl. 5A (restoration).

Referred Specimens of †*S. porteousi* in David (1943:160) that Barsukov reidentified as paratype of ***†S. thermophilus***: CAS 55588 (SU 600, 59), left counterpart. **Scorpaenidae.**

Referred Specimens of †*S. apostates* in David (1943:162) that Barsukov reidentified as holotype of ***†S. thermophilus***: CAS 55501 (SU 636, 72),), nearly complete left counterpart. **Scorpaenidae.**

Referred Specimens of ***†S. thermophilus*** in Schultz (1993): None.

Referred Specimens of ***†S. thermophilus*** in Love et al. (2002): None.

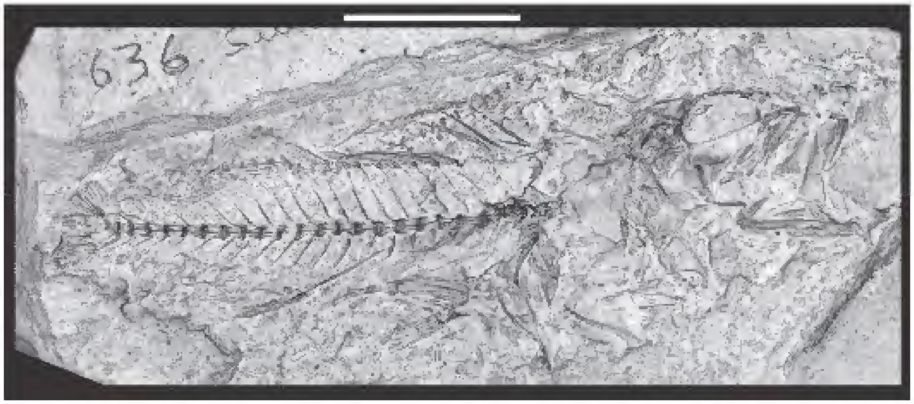


FIGURE 66. †*Sebastes thermophilus* Barsukov 1989, holotype, CAS 55501 (from color image provided by CAS); scale bar equals 5 cm.

†*Sebastes velox* Barsukov 1989

Figure 67

Selected Synonymy & References

†***Rixator ineziae*** Jordan *I* Jordan and Gilberet 1920:35 [in part]: Barsukov 1989:82.
†***Sebastinus ineziae*** (Jordan): Jordan 1925:37: Barsukov 1989.
†***Sebastodes* (*Sebastinus*) *ineziae*** (Jordan): David 1943:158.
†***Sebastodes* (*Rixator*) *porteousi*** (Jordan and Gilbert): David 1943:160.
†***Sebastes* (*Sebastodes*) *velox*** Barsukov 1989:82, pl. 5B.
†***Sebastes velox*** Barsukov: Schultz 1993:136, fig. 7/36.
†***Sebastes velox*** Barsukov: Love et al. 2002:13.

Type Specimen: †***Rixator ineziae*** Jordan ***in*** Jordan and Gilbert 1920 [in part]: holotype, CAS 55528 (SU 341, 57), partial left counterpart with tail and part of head missing, figured in Barsukov 1989, pl. 5B (restoration).

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Paratypes: CAS 55648 (SU 659, 58), right counterpart; CAS 55543 (SU 521, 68), right counterpart.

Referred Specimens: None.

Referred Specimens of †*R. ineziae* in Jordan *in* Jordan and Gilbert (1920) reidentified by Barsukov (1989) as holotype of †*S. velox*: CAS 55528 (SU 341, 57). **Scorpaenidae.**

Referred Specimens of †*S. ineziae* in Jordan (1925:37) reidentified by Barsukov as a paratype of †*S. velox*: CAS 55648 (SU 659, 58), right counterpart.

Referred Specimens of †*S. ineziae* in David (1943:158) reidentifed by Barsukov as a paratype of †*S. velox*: CAS 55543 (SU 521, 68), right counterpart. **Scorpaenidae.**

Referred Specimens of †*S. porteousi* in David (1943:160) reidentified by Barsukov as the holotype and a paratype of †*S. velox*: Holotype: CAS 55528 (SU 341, 57) and paratype: CAS 55648 (SU 659, 58). **Scorpaenidae.**

Referred Specimens of †*S. velox* in Schultz (1993): None.

Referred Specimens of †*S. velox* in Love et al. (2002): None.

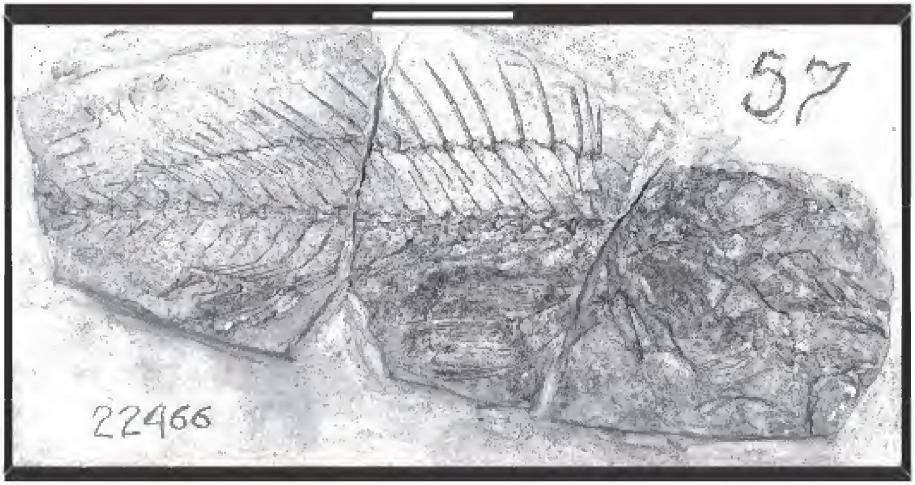


FIGURE 67. †*Sebastes velox* Barsukov 1989, holotype, CAS 55528 (from color image provided by CAS); scale bar equals 3 cm.

Sebastes paucispinis Ayres 1854

Selected Synonymy & References (fossils only)

Sebastes paucispinis Ayres 1854: Downs 1968:53, text-fig. 25A.
Sebastes paucispinis Ayres: Fitch and Lavenberg 1971:135.

Type Specimen: Extant, ***Sebastes paucispinis*** Ayres 1854, holotype, whereabouts unknown (Eschmeyer 1998:1301).

Type Locality: California.

Referred Specimens in Downs (1968:53, text-fig. 25A): one otolith (text-fig. 25 A) from either the Pliocene or Pleistocene.

Referred Specimens in Fitch and Lavenberg (1971:135): Authors note that otoliths of ***S. paucispinis*** have been found in several Pliocene deposits.

Remarks: Because Downs (1968) and Fitch and Lavenberg (1971) did not give any specific fossil locality that contained otoliths of ***S. paucispinis***, its presence in the Neogene of California is questionable.

†***Sebastes rosae*** (Eigenmann 1890)

Selected Synonymy & References

†***Sebastodes* (?) *rosae*** Eigenmann 1890:16, unnumbered fig.
†***Sebastodes rosae*** Eigenmann: Jordan and Gilbert 1919a:63

Type Specimen: †***Sebastodes* (?) *rosae*** Eigenmann 1890, holotype, preopercle, unnumbered figure, whereabouts unknown (see Remarks).

Type Locality: Port Harford (now Port San Luis), Avila beach, San Luis Obispo County.

Referred Specimens: None.

Referred Specimens in Jordan and Gilbert (1919a:63): They briefly describe the holotype and incorrectly list the original type description on page 17, whereas page 16 is correct.

Remarks: We place †***Sebastodes rosae*** in the genus ***Sebastes*** to agree with our assignment of other species of the Subfamily Sebastinae. Eigenmann (1890) and Jordan and Gilbert (1919a) gave only brief information about the specimen. Because they stated it was collected in Tertiary rocks, we suggest it was the Squire Member (Late Pliocene) of the Pismo Formation, strata that are well exposed in the area of Port San Luis and have produced a fossil marine vertebrate (Domning 1978:75). The authors do not indicate the institution where the specimen was deposited.

***Sebastes* sp.**

Selected Synonymy & References (fossils only)

†***Sebastodes* sp.**: David 1944:40, pl, 4, fig. 41.
†***Sebastodes* aff. *S. elongatus***: Pierce 1956:1313, pl. 144, fig. 15.
†***Sebastodes* sp.**: Fitch and Reimer 1967:79. 84, 86-87, table 2, fig. 6.
†***Sebastodes* sp.**: Zinsmeister 1970:124, table 1.
†***Sebastes* sp.**: Fitch and Lavenberg 1971:132.

Referred Specimens in David (1944: 40, pl. 4, fig. 41): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; scale (pl. 4, fig. 41), whereabouts unknown.

Referred Specimens in Pierce (1956): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3646, scale (pl. 144, fig. 15), whereabouts unknown.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; three otoliths (one figured in fig. 10).

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County;

no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Fitch and Lavenberg (1971:132): Authors note that otoliths of ***Sebastes*** are abundant in Pliocene deposits along the California coast.

Remarks: Pierce identified the scale as ***Sebastodes* aff. *S. elongatus***, but this was based on an unpublished manuscript of David. According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***Sebastes* sp.** from this locality is questionable.

†***Sebastinus* sp.** Jordan 1920b

Selected Synonymy & References

†***Sebastinus* sp.**: Jordan 1920b:571

†***Sebastinus* sp.**: Jordan: Jordan 1921a:288.

Referred Specimens in Jordan (1921a): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 54 (whereabouts unknown).

Subfamily **Scorpaeninae**

Genus ***Scorpaena*** Linnaeus 1758

†***Scorpaena ensiger*** (Jordan and Gilbert 1919a)

Figure 68

Selected Synonymy & References

†***Rhomarchus ensiger*** Jordan and Gilbert 1919a:51, pl. 31, fig. 5.

†***Rhomarchus ensiger*** Jordan and Gilbert: Jordan 1921a:288, pl. 55 (restoration).

†***Scorpaena ensiger*** (Jordan and Gilbert): David 1943:42-43, pl. 6, fig. 2.

†***Scorpaena ensiger*** (Jordan and Gilbert): Jerzmanska 1958:151.

†***Scorpaena ensiger*** (Jordan and Gilbert): Schultz 1993:145-146.

Type Specimen: †***Rhomarchus ensiger*** Jordan and Gilbert 1919a, holotype, CAS 55418 (SU 49, 75), left counterpart. **Scorpaenidae.**

Type Locality: Hewes (= Hews) Park, El Modena, Monterey Formation, Late Miocene, Orange County.

Paratype(s): None assigned.

Referred Specimens in Jordan (1919a): From type locality: SU 124 (whereabouts unknown). **Scorpaenidae.**

Referred Specimens in Jordan (1921a): None. **Scorpaenidae.**

Referred Specimens in David (1943): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10226, left counterpart.

From LACM (CIT) locality 334, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM 4723, left counterpart. **Scorpaenidae.**

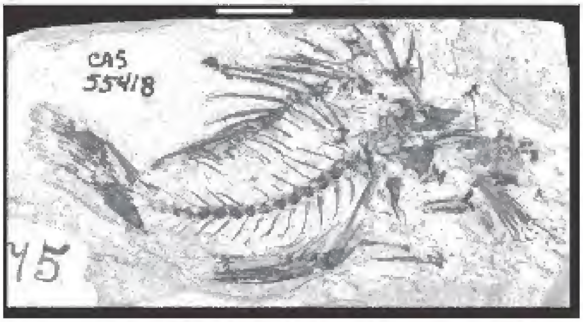


FIGURE 68. †***Scorpaena ensiger*** (Jordan and Gilbert 1919a), holotype, CAS 55418 (from color image provided by CAS); scale bar equals 1 cm.

Referred Specimens in Jerzmanska (1958): See distribution section below. **Scorpaenidae**.
Referred Specimens in Schultz (1993): None. **Scorpaenidae**.
Distribution of Neogene †*S. ensiger* outside of California: Jerzmanska (1958:151) identified a single specimen from the Middle Miocene, Poland. Schultz (1993:146) questioned its validity, because otherwise the species is only known from the Eastern Pacific. He did not revise Jerzmanska's identification.

***Scorpaena* sp.**

***Scorpaena* sp.**: David 1943:75.

Referred Specimens: From LACM (CIT) locality 379, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10194, counterpart of a juvenile specimen.

Scorpaenidae genus and species undetermined or ***Stereolepis***

Selected Synonymy & References

†***Lutianus hagari*** Jordan and Gilbert 1919a:48, pl. 15, figs. 1, 4.
†*Neomaenis hagari* (Jordan and Gilbert): Jordan 1921a:278, pl. 46 (restoration).
Scorpaenidae sp. indet. **or *Stereolepis***: Swift and Ellwood 1972:3.

Type Specimen of †***Lutianus hagari*** Jordan and Gilbert 1919a: From LACM locality 1033, El Modena, Monterey Formation, Late Miocene, Orange County; CAS 70010 (SU 19, 107), right counterpart; LACM 1329, left counterpart.
Referred Specimens: None.
Referred Specimens in Jordan (1921a): None.
Remarks: ***Lutianus*** is a misspelling of ***Lutjanus*** (Eschmeyer 1990). Swift and Ellwood (1972) examined the holotype, the only known specimen, and concluded that it should be excluded from the family Lutjanidae because its characters are most similar to many scorpaenids and the genus ***Stereolepis***.

Scorpaenidae genus and species undetermined: David 1944:40, pl. 4, fig. 42

Referred Specimens in David (1944): From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene (Mohnian), Los Angeles County; scale, whereabouts unknown.

Suborder **Anoplopomatoidei**

Family **Anoplopomatidae**

Genus †***Eoscorpius*** Jordan and Gilbert 1919a

†***Eoscorpius primaevus*** Jordan and Gilbert 1919a

Selected Synonymy & References

†***Eoscorpius primaevus*** Jordan and Gilbert 1919a:53-55, pl. 30.
†***Eoscorpius primaevus*** Jordan and Gilbert: Jordan 1920b:569.
†***Eoscorpius primaevus*** Jordan and Gilbert: Jordan 1921a:284.

Type Specimen: †***Eoscorpius primaevus*** Jordan and Gilbert 1919a, holotype, SU 39, left tailless counterpart, whereabouts unknown. **Cottidae**.
Type Locality: Bairdstown (= El Sereno neighborhood of east Los Angeles), Monterey Formation, Late Miocene, Los Angeles County.
Referred Specimens: None.
Referred Specimens in Jordan (1920b): None. Noted that the fossil has uncertain relations and may belong to the **Cottidae**.

Referred Specimens in Jordan (1921a): None. Jordan discussed the holotype and noted that it definitely is not a cottid, although it may be a scombrid, if it proves to not be a member of the **Anoplopomatidae** (= **Anoplopomidae**).

Suborder **Hexagrammoidei**

Family ?**Hexagrammidae**

Genus †*Achrestogrammus* Jordan 1921a
†*Achrestogrammus achrestus* (Jordan and Gilbert 1919a)

Figure 69

Selected Synonymy & References

†*Hexagrammos achrestus* Jordan and Gilbert 1919a:52, pl. 24, fig. 2.
†*Hexagrammos achrestus* Jordan and Gilbert: Jordan and Gilbert 1920:36, pl. 19.
†*Achrestogrammus achrestus* (Jordan and Gilbert): Jordan 1921a:289.
†*Achrestogrammus achrestus* (Jordan and Gilbert): Jordan 1922a:274, middle picture (restoration).
†*Achrestogrammus achrestus* (Jordan and Gilbert): David 1943:164.

Type Specimen: †*Hexagrammos achrestus* Jordan and Gilbert 1919a, holotype, CAS 55423 (SU 140, 108), partial right counterpart. **Hexagrammidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Referred Specimens in Jordan and Gilbert (1920): From type locality: CAS 55433 (SU 301), partial left counterpart.

Referred Specimens in Jordan (1921): None.

Referred Specimens in Jordan (1922a): None.

Referred Specimens in David (1943): CAS 55433 (SU 301, 109a) and 55525 (SU 301, 109), partial left and right counterparts. ?**Hexagrammidae.**

Remarks: Plate 24, fig. 2 in Jordan and Gilbert (1919a) illustrates the exact same specimen as seen in plate 19 of Jordan and Gilbert (1920).

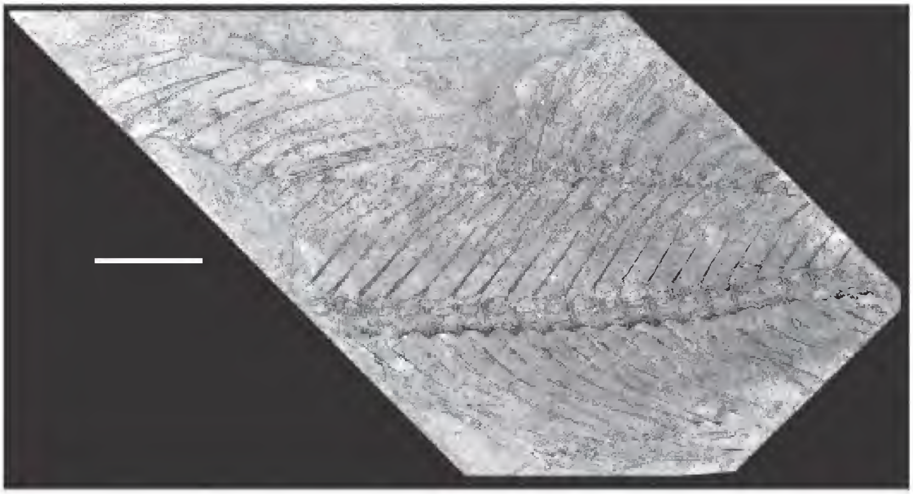


FIGURE 69. †*Achrestogrammus achrestus* (Jordan and Gilbert 1919a), holotype, CAS 55423 (from color image provided by CAS); scale bar equals 3 cm.

Family **Hexagrammidae** genus and species undetermined

Referred Specimen in Jordan (1927a:11): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 476, headless torso, whereabouts unknown.

Suborder **Cottoidei**

Family **Cottidae**

Genus ***Artedius*** Girard 1856a
Artedius notospilotus Girard 1856a

Selected References (fossils only)

Artedius notospilotus Girard 1856a: Fitch and Reimer 1967:79, 84, 87; fig. 6.
Artedius notospilotus Girard: Fitch 1968:18.
Artedius notospilotus Girard: Nolf 1985:78.

Type Specimen: Extant, ***Artedius notospilotus*** Girard, syntypes USNM 329 and others (Eschmeyer 1998:1200).

Type Locality: Tomales Bay, California.

Referred Specimens in Fitch and Reimer (1967:79, 84, 87; fig. 6): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one otolith (fig. 6).

Referred Specimens in Fitch (1968:18): No specific specimens. He notes that otoliths of ***A. notospilotus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1968) that otoliths have been found in the California Pliocene.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***A. notospilotus*** from this locality is questionable. No other Pliocene locality was cited.

Genus ***Chitonotus*** Lockington 1879c
Chitonotus pugetensis (Steindachner 1876)

Selected Synonymy & References

Artedius pugetensis Steindachner 1876:181.
Chitonotus pugetensis (Steindachner): Fitch 1967:15.
Chitonotus pugetensis (Steindachner): Fitch 1968:18.
Chitonotus pugetensis (Steindachner): Nolf 1985:78.

Type Specimen: Extant, ***Artedius pugetensis*** Steindachner 1876, syntypes NMW 6795-96 and others (Eschmeyer 1998:1392).

Type Locality: Near Port Townend, Puget sound, Washington; near San Francisco, California (Eschmeyer 1998:1392).

Referred Specimens in Fitch (1967:15): No specific specimens. Otoliths of ***C. pugetensis*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:18): Cites the same information as in Fitch (1967) (see entry above).

Referred Specimens in Nolf (1985:78): No specific specimens. He notes that Fitch (1967) has recorded otoliths of ***C. pugetensis*** from the Pliocene of California.

Remarks: Because Fitch (1967, 1968) did not give any specific fossil locality containing otoliths of ***C. pugetensis***, its presence in the Neogene of California is questionable.

Genus ***Cottus*** Linnaeus 1758
***Cottus* sp.**

Referred Specimens in Wagner et al. (1997:17): They listed **cf. *Cottus*** among the vertebrates recovered from the Secret Valley-Mudflat locality (no locality number), upper Alturas Formation, Early Pliocene, Lassen County;

Referred Specimen identified as ***Cottus* sp.** in Smith et al (2002:225, table 1): From Secret Valley (no locality number), upper Alturas Formation, Early Pliocene, Lassen County; Identification was based on a basioccipital (no museum number).

Genus ***Enophrys*** Swainson 1839
Enophrys taurinus Gilbert 1914

Selected References (fossils only)

Enophrys taurinus Gilbert 1914:135.
Enophrys taurinus Gilbert: Fitch 1967:15.
Enophrys taurinus Gilbert: Nolf 1985:78.

Type Specimen: Extant, ***Enophrys taurinus*** Gilbert, holotype, USNM 75064 (Eschmeyer 1998:1654).

Type Locality: Monterey Bay, near Pacific Grove, California.

Referred Specimens in Fitch (1967:15): No specific specimens. He notes that otoliths of ***E. taurinus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1967) that otoliths of ***E. taurinus*** have been found in the California Pliocene.

Remarks: Because Fitch (1967) did not give any specific fossil locality containing otoliths of ***E. taurinus***, its presence in the Neogene of California is questionable.

Genus ***Icelinus*** Jordan 1885
Icelinus filamentosus Gilbert 1890

Selected References (fossils only)

Icelinus filamentosus Gilbert 1890: Fitch 1968:19.
Icelinus filamentosus Gilbert: Nolf 1985:78.

Type Specimen: Extant, ***Icelinus filamentosus*** Gilbert, syntype SU 118 and others (Eschmeyer 1998:580).

Type Locality: Off southern California (Eschmeyer 1998:580).

Referred Specimens in Fitch (1968:19): No specific specimens. He notes that otoliths of ***I. filamentosus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1968) that otoliths of ***I. filamentosus*** have been found in the California Pliocene.

Remarks: Because Fitch (1968) did not give any specific fossil locality containing otoliths of ***I. filamentosus***, its presence in the Neogene of California is questionable.

Icelinus fimbriatus Gilbert 1890

Selected References (fossils only)

Icelinus fimbriatus Gilbert 1890: Fitch 1968:19.
Icelinus fimbriatus Gilbert: Nolf 1985:78.

Type Specimen: Extant, ***Icelinus fimbriatus*** Gilbert, syntypes USNM 43087 and 48246 (Eschmeyer 1998:583).

Type Locality: Off southern California (Eschmeyer 1998:583).

Referred Specimens in Fitch (1968:19): No specific specimens. He notes that otoliths of ***I. fimbriatus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1968) that otoliths of ***I. fimbriatus*** have been found in the California Pliocene.

Remarks: Because Fitch (1968) did not give any specific fossil locality containing otoliths of ***I. fimbriatus***, its presence in the Neogene of California is questionable.

Icelinus quadriseriatus (Lockington 1880)

Selected References (fossils only)

Artedius quadriseriatus Lockington 1880
Icelinus quadriseriatus (Lockington): Fitch 1967:15.
Icelinus quadriseriatus (Lockington): Fitch 1968:19.
Icelinus quadriseriatus (Lockington): Nolf 1985:78.

Type Specimen: Extant, ***Icelinus quadriseriatus*** Lockington, syntypes USNM 23503 (Eschmeyer 1998:1416).

Type Locality: San Francisco, California (Eschmeyer 1998:1416).

Referred Specimens in Fitch (1967:15): No specific specimens. He notes that otoliths of ***I. quadriseriatus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:19): Same information as Fitch (1967), see entry above.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1968) that otoliths of ***I. quadriseriatus*** have been found in the California Pliocene.

Remarks: Because Fitch (1967, 1968) did not give any specific fossil locality containing otoliths of ***I. quadriseriatus***, its presence in the Neogene of California is questionable.

Icelinus tenuis Gilbert 1890

Selected References (fossils only)

Icelinus tenuis Gilbert 1890:86: Fitch 1967:15.
Icelinus tenuis Gilbert: Fitch 1968:19.
Icelinus tenuis Gilbert: Nolf 1985:78.

Type Specimen: Extant, ***Icelinus tenuis*** Gilbert 1890, syntypes SU 78 and others (Eschmeyer 1998: 1662).

Type Locality: Off southern California.

Referred Specimens in Fitch (1967:15): No specific specimens. He notes that otoliths of ***I. tenuis*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:19): Same information as Fitch (1967), see entry above.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1968) that otoliths of ***I. tenuis*** have been found in the California Pliocene.

Remarks: Because Fitch (1967, 1968) did not give any specific fossil locality containing otoliths of ***I. tenuis***, its presence in the Neogene of California is questionable.

Genus ***Leptocottus*** Girard 1854a

Leptocottus armatus Girard 1854a

Selected References (fossils only)

Leptocottus armatus Girard 1854a: Fitch 1967:15.
Leptocottus armatus Girard: Fitch 1968:20.
Leptocottus armatus Girard: Nolf 1985:78.

Type Specimen: Extant, ***Leptocottus armatus*** Girard, syntypes MCZ 36019 and others (Eschmeyer 1998:141).

Type Locality: San Francisco, California.

Referred Specimens in Fitch (1967:15): Otoliths of ***L. armatus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968): Same information as the entry above.

Referred Specimens in Fitch and Lavenberg (1975:47): No specific specimens, they only mention that *L. armatus* remains have been found in Pliocene and later deposits in California.

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1967) that otoliths of *L. armatus* have been found in the Pliocene of California.

Remarks: Because Fitch (1967, 1968) did not give any specific fossil locality containing otoliths of *L. armatus*, its presence in the Neogene of California is questionable.

Genus †*Lirosceles* Jordan 1925

†*Lirosceles elegans* Jordan 1925

Figure 70

Selected Synonymy & References

†***Lirosceles elegans*** Jordan 1925:32-33, pl. 16b
†***Lirosceles elegans*** Jordan: David 1943:163

Type Specimen: †***Lirosceles elegans*** Jordan 1925, holotype, CAS 55584 (SU 656, 206), right counterpart. **Embiotocidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Referred Specimens in David (1943): None. **Cottidae.**

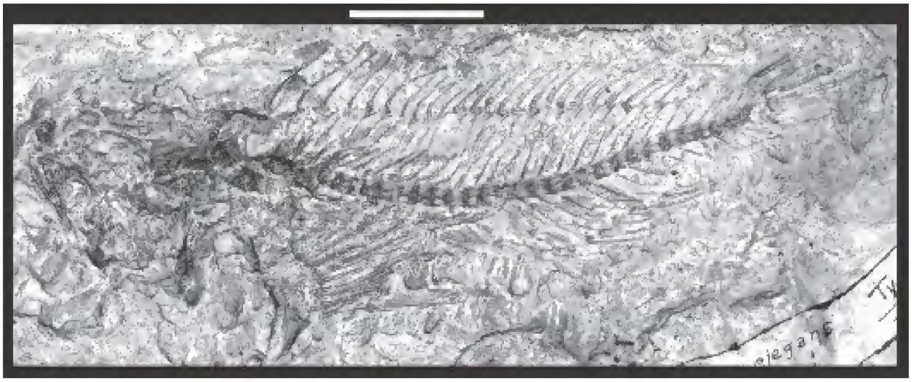


FIGURE 70. †*Lirosceles elegans* Jordan 1925, holotype, CAS 55584 (from color image provided by CAS); scale bar equals 3 cm.

Genus ***Radulinus*** Gilbert 1890

Radulinus asprellus Gilbert 1890

References (fossils only)

Radulinus asprellus Gilbert 1890: Fitch 1967:16, 19.
Radulinus asprellus Gilbert: Fitch 1968:20.
Radulinus asprellus Gilbert: Zinsmeister 1970:124, table 1.
Radulinus asprellus Gilbert: Nolf 1985:78.

Type Specimen: Extant, ***Radulinus asprellus*** Gilbert, lectotype, USNM 43096 (Eschmeyer 1998:149).

Type Locality: Off the Northwest United States of America.

Referred Specimens in Fitch (1968:20): No specific specimens. He notes that otoliths of ***R. asprellus*** have been found in several southern California Pliocene and Pleistocene deposits, over 1,300 having been recovered from the Lomita Marl, Pliocene, San Pedro (see Remarks).

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Uppper Newport Bay, Fernando Formation, Plio-Pleistocene, Orange County; no specific specimens mentioned.

Referred Specimens in Nolf (1985:78): He cites Fitch (1967) that otoliths of ***R. asprellus*** have been found in the California Pliocene.

Remarks: Fitch (1967, 1968) listed otoliths of ***R. asprellus*** from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but now considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Psychrolutidae**

Genus ***Malacocottus*** Bean 1890
Malacocottus zonurus Bean 1890

Selected References (fossils only)

Malacocottus zonurus Bean 1890: Fitch 1967:19-21.
Malacocottus zonurus Bean: Fitch 1968:20.
Malacocottus zonurus Bean: Zinsmeister 1970:124, table 1.
Malacocottus zonurus Bean: Nolf 1985:78.

Type Specimen: Extant, ***Malacocottus zonurus*** Bean 1890, seven syntypes USNM 44643 (Eschmeyer 1998:1819).

Type Locality: Off Trinity Island, Alaska.

Referred Specimens in Fitch (1968:20): No specific specimens. He notes that over 650 otoliths of ***M. zonurus*** have been found in the Lomita Marl (see Remarks).

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; no specific specimens mentioned.

Referred Specimens in Nolf (1985:78): He cites Fitch (1967) that otoliths have been found in the Pliocene of California.

Remarks: Fitch (1967, 1968) listed otoliths of ***M. zonurus*** from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but now considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Cottidae (?)**

Genus †***Hayia*** Jordan and Gilbert 1919a
†***Hayia daulica*** Jordan and Gilbert 1919a

Figure 71

Selected Synonymy & References

†***Hayia daulica*** Jordan and Gilbert 1919a:55-56, pl. 23, fig. 2.
†***Hayia daulica*** Jordan and Gilbert: Jordan 1920b:569.
†***Hayia daulica*** Jordan and Gilbert: Jordan 1921a:290.

Type Specimen: †***Hayia daulica*** Jordan and Gilbert 1919a, holotype, CAS 55412 (SU 27), head of right counterpart. **Cottidae**.

Type Locality: Los Angeles, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1920b): Only lists the holotype as a probable cottoid.

Referred Specimens in Jordan (1921a): Only discussed the type and its possible affinities with **Cottidae**. **Cottidae (?)**.

Remarks: "***Eoscorpius primaevus*** **Type**" is written on the above specimen, but this is a mistake because CAS 55412 looks nothing like the holotype of †***E. primaevus*** in Jordan and Gilbert (1919a:pl. 30).

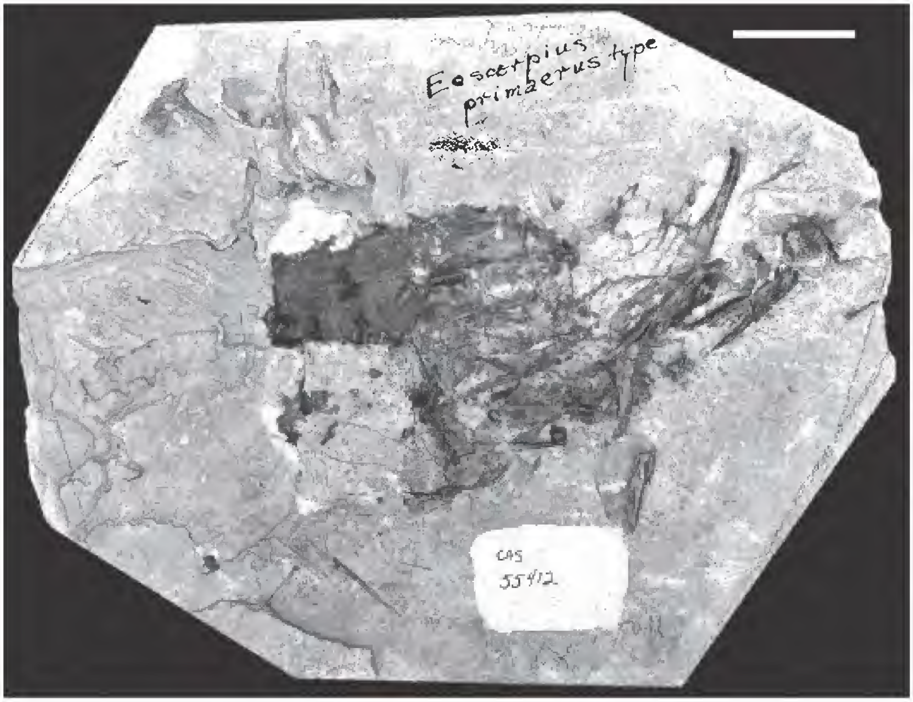


FIGURE 71. †***Hayia daulica*** Jordan and Gilbert 1919a, holotype, CAS 55412 (from color image provided by CAS); scale bar equals 3 cm.

Order **Perciformes**
Suborder **Percoidei**

Family **Serranidae**

Genus ***Paralabrax*** Girard 1856a
***Paralabrax* sp.**

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Genus †***Protanthias*** David 1943
†***Protanthias fossilis*** David 1943:132-133, text-fig. 25
Figure 72

Type Specimen: †***Protanthias fossilis*** David 1943, holotype, LACM (CIT) 10198, left counterpart. **Serranidae.**

Type Locality: Near LACM (CIT) locality 385, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

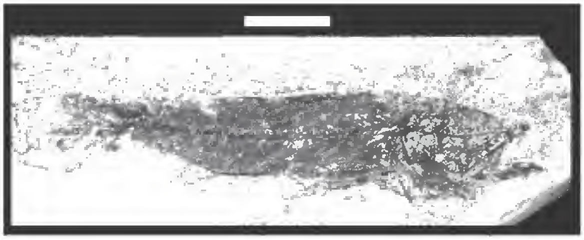


FIGURE 72. †*Protanthias fossilis* David 1943, holotype, LACM (CIT) 10198 (from color image provided by LACM); scale bar equals 1 cm.

Family **Centrarchidae**

Genus *Archoplites* Gill 1861c
Archoplites* cf. *A. interruptus (Girard 1854a)

Selected Synonymy & References

Centrarchus interruptus Girard 1854a.
Archoplites cf. ***A. interruptus*** (Girard): Casteel and Rymer 1975:620-621, fig. 2D.
Archoplites cf. ***A. interruptus*** (Girard): Casteel and Adam 1977:214.
Archoplites cf. ***A. interruptus*** (Girard): Casteel and Rymer 1980:232, table 31

Lectotype and Type Locality of ***Centrarchus interruptus***: Extant, ANSP 13430 from Sacramento River, California (Eschmeyer 1998:786).

Referred Specimens in Casteel and Rymer (1980:232, table 31): From USGS vertebrate locality M-1354, Cache Formation, Plio-Pleistocene, Lake County; USNM 252775, five scales.

From USGS vertebrate locality M-1350, Cache Formation, Plio-Pleistocene, Lake County; USNM 252776, scale fragment and a pharyngeal tooth.

Remarks: According to Casteel and Rymer (1980) and Rymer (1981), USGS vertebrate locality M-1239 is in the Pleistocene Lower Lake Formation, not the Plio-Pleistocene Cache Formation as previously thought. Therefore the scale (USNM 184075) described and figured by Casteel and Rymer (1975:620-621, fig. 2D) and mentioned by Casteel and Adam (1977:214) as belonging to ***Archoplites*** cf. ***A. interruptus***, was not found in a Neogene deposit.

Family **Apogonidae**

Genus †***Eritima*** Jordan and Gilbert 1919a
†***Eritima evides*** Jordan and Gilbert 1919a

Figure 73

Selected Synonymy & References

†***Eritima evides*** Jordan and Gilbert 1919a:40-41, pl. 23, fig.1.
†***Eritima evides*** Jordan and Gilbert: Jordan 1920b:569.
†***Eritima evides*** Jordan and Gilbert: Jordan 1921a:277, pl. 22 (restoration).

Type Specimen: †***Eritima evides*** Jordan and Gilbert 1919a, holotype, CAS 66547.01 (SU 31), right counterpart. **Trachichthyidae (?)**.

Type Locality: Bairdstown (= El Sereno neighborhood of east Los Angeles), Monterey Formation, Late Miocene, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1920b): None. **Apogonidae**.

Referred Specimens in Jordan (1921a): None. Only discussed the type and is convinced it is belongs to the **Apogonidae** rather than **Trachichthyidae**.

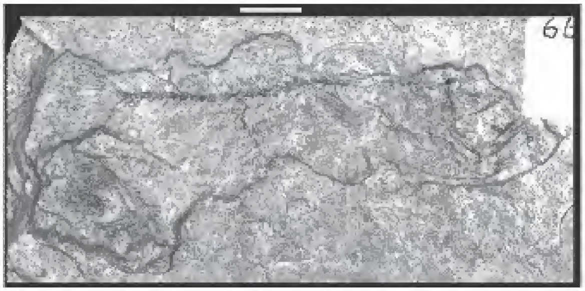


Figure 73. †***Eritima evides*** Jordan and Gilbert 1919a, holotype, CAS 66547.01 (from color image provided by CAS); scale bar equals 1 cm.

Family **Pomatomidae**

Genus †***Pseudoseriola*** David 1943

†***Pseudoseriola gilliandi*** David 1943

Figure 74

Selected Synonymy & References

†***Pseudoseriola gilliandi*** David 1943:36. pl. 6.
†***Pseudoseriola gilliandi*** David: Stewart 1995:54A.

Type Specimen: †***Pseudoseriola gilliandi*** David 1943, holotype, LACM (CIT) 10000, right counterpart. **Pomatomidae**.

Type Locality: LACM (CIT) locality 317, Sepulveda Canyon, Modelo Formation, Late Miocene, Los Angeles County.

Referred Specimens: None.

Material examined by Stewart (1995): No specific specimens, however he mentioned seven additional specimens of †*P. gilliandi* from the Puente and Modelo formations of Southern California. **Pomatomidae**.

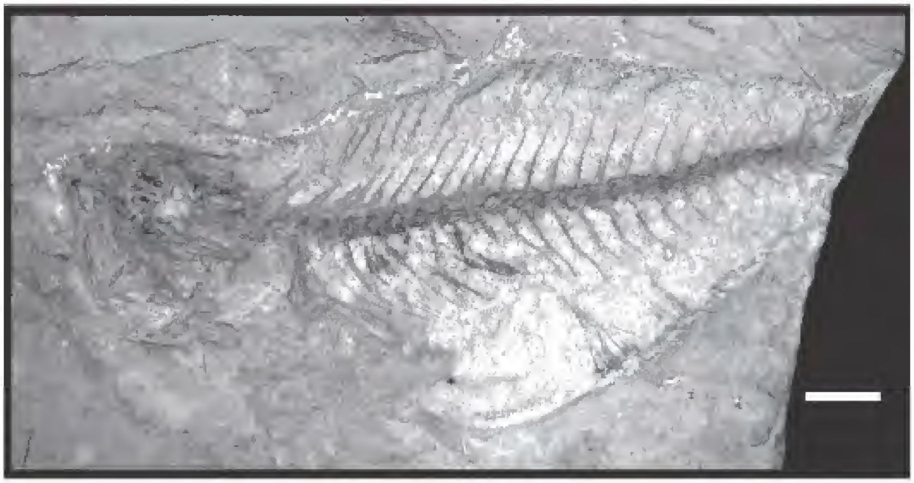


Figure 74. †*Pseudoseriola gilliandi* David 1943, holotype, LACM (CIT) 10000 (from color image provided by LACM); scale bar equals 3 cm.

†*Pseudoseriola sanctaeineziae* (Jordan 1925)

Figure 75

Selected Synonymy & References

†***Seriola sanctae-ineziae*** Jordan 1925:26, pl. 18.
†***Pseudoseriola sanctae-ineziae*** (Jordan): David 1943:145.

Type Specimen: †***Seriola sanctae-ineziae*** Jordan 1925, holotype, CAS 70112 (SU 673, 181), partial left counterpart. **Seriolidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Specimens examined by David (1943): Holotype only. **Pomatomidae.**

Remarks: The hyphen was removed from the species name to comply with Article 27 of the International Code of Zoological Nomenclature (Eschmeyer (1990:253).

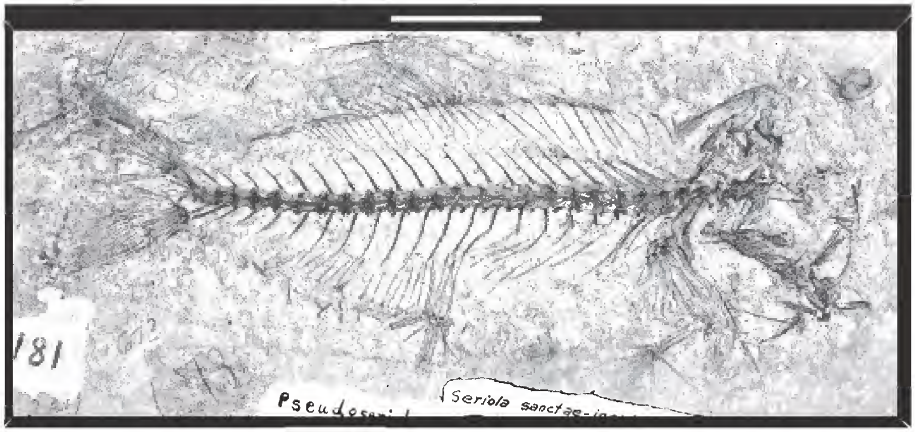


FIGURE 75. †*Pseudoseriola sanctaeineziae* (Jordan 1925), holotype, CAS 70112 (from color image provided by CAS); scale bar equals 5 cm.

†*Pseudoseriola* sp. David 1943

Selected Synonymy & References

†***Pseudoseriola* sp.** David 1944:41, pl. 5, figs. 45, 46.
†***Pseudoseriola* sp.** David: Pierce 1956:1311, pl. 144, fig. 14.

Referred Specimens in David (1944): From Western Gulf Oil Company Symons well number 12-17, Buena Vista District, San Joaquin Valley, Middle-Late Miocene, Kern County; two scales (pl. 5, figs, 45, 46), whereabouts unknown.

Referred Specimens in Pierce (1956): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3645, scale (pl. 144, fig. 14), whereabouts unknown.

Genus †*Lophar* Jordan and Gilbert 1919a

†*Lophar miocaenus* Jordan and Gilbert 1919a

Figure 76

Selected Synonymy & References

†***Lophar miocaenus*** Jordan and Gilbert 1919a:44-46, pl. 23, fig. 2 (restoration); pl 19, pl. 20 (restoration of head).
†***Lophar miocaenus*** Jordan and Gilbert: Jordan 1920b:569.
†***Lophar miocaenus*** Jordan and Gilbert: Jordan 1921a:277.

Type Specimen: †***Lophar miocaenus*** Jordan and Gilbert 1919a, holotype, CAS 70001 (SU 48), right counterpart. **Pomatomidae**.

Type Locality: No formation or age given, Puente Division, Los Angeles Brick Co., Chavez Ravine, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1920b): None. **Pomatomidae.**

Referred Specimens in Jordan (1921a): None, only discussed the holotype. **Pomatomidae.**

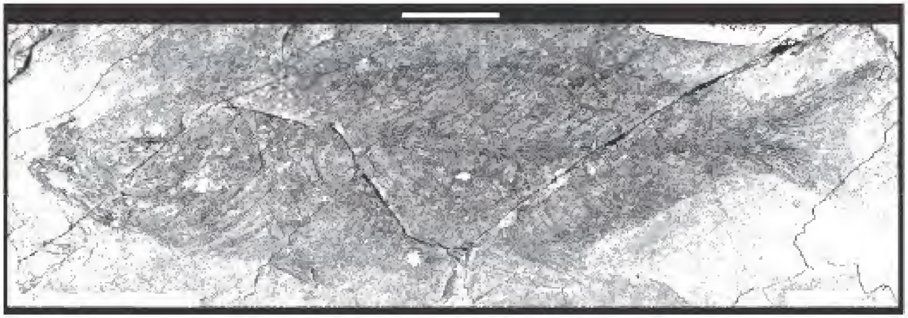


FIGURE 76. †***Lophar miocaenus*** Jordan and Gilbert 1919a, holotype, CAS 70001 (from color image provided by CAS); scale bar equals 5 cm.

Family **Carangidae**

Genus ***Decapterus*** Bleeker 1851
†***Decapterus hopkinsi*** (Jordan *in* Jordan and Gilbert 1920)

Selected Synonymy & References

†***Lompochites hopkinsi*** Jordan *in* Jordan and Gilbert 1920:30, pl. 20.
†***Lompochites hopkinsi*** Jordan: Jordan 1921a:276, pl. 41b (restoration).
†***Lompochites hopkinsi*** Jordan: Jordan 1922a:272, fig. 2.lower (restoration).
†***Coronadus agilis*** Jordan 1925: David 1943:28, pl. 14.
†***Decapterus*** cf. ***agilis*** (Jordan): David 1943:34, pl. 5, fig. 2.
†***Decapterus*** cf. ***agilis*** (Jordan): David 1943:74.
†***Decapterus*** **(*Lompochites*)** ***hopkinsi*** (Jordan): David 1943:147. text-fig. 30.

Type Specimen: †***Lompochites hopkinsi*** Jordan 1920d, holotype, SU 101 (figured as 301), right counterpart, whereabouts unknown. **Sciaenidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan *in* Jordan and Gilbert (1920): None.

Referred Specimens in Jordan (1921a): None. **Carangidae.**

Referred Specimens in Jordan (1922a): None.

Referred Specimens of †*Coronadus agilis* Jordan examined by David (1943:34, 74): From LACM (CIT) locality 317, Sepulveda Canyon, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10221, right counterpart.

From LACM (CIT) locality 379, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10172, left counterpart.

From LACM (CIT) locality 326B, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; uncatalogued specimen. **Carangidae.**

Referred Specimens and Holotypes assigned to †***D. hopkinsi*** by David (1943:147): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; holotype of †***L. hopkinsi***: SU 101 (figured as 301), whereabouts unknown; holotype of †***C. agilis***: SU 639 (176), whereabouts unknown; CAS 55444 (SU 643, 180), left counterpart; 55460 (SU 70, 179), poorly preserved counterpart; 55477 (SU 641, 178), partial right counterpart; 55661 (SU 640, 177), partial right counterpart; and the following specimens whereabouts unknown: SU 635A and 635B (168 and 169B), 642 (169); USC 203; UCLA 8667. **Carangidae**.

†***Decapterus* (*Lompochites*) cf. *hopkinsi*** (Jordan *in* Jordan and Gilbert 1920)

Selected Synonymy & References

†***Decapterus* (*Lompochites*) cf. *hopkinsi*** (Jordan *in* Jordan and Gilbert 1920): David 1944:39-40, text-fig. 7, pl. 4, fig. 37.

†***Decapterus* (*Lompochites*) cf. *hopkinsi*** (Jordan): Pierce 1956:1310, pl. 144, fig. 8.

Referred Specimens in David (1944): From Continental Oil Company "Turnbull" well number 3, Puente Hills, Lower Puente Formation, Middle-Late Miocene, Los Angeles County; scale (pl. 4, fig. 37), whereabouts unknown.

From Girard-Mineral Springs, Modelo Formation, Late Miocene, Los Angeles County; scale (text-fig. 7), whereabouts unknown.

Referred Specimens in Pierce (1956:1310, pl. 144, fig. 8): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; scale, USC 3640 (pl. 144, fig. 8), whereabouts unknown.

***Decapterus* sp.** David 1944

Selected Synonymy & References

***Decapterus* sp.**: David 1944:39, pl. 4, fig. 38.

***Decapterus* sp.**: Huddleston and Takeuchi 2006:33, table 1.

Referred Specimens in David (1944:39, pl. 4, fig. 38): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; scale (pl. 4, fig. 38), whereabouts unknown.

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Genus ***Caranx*** Lacepède 1801

***Caranx* sp.** Fierstine 1968:7, figs. 4, 5

Referred Specimens: From LACM locality 1557, Sharktooth Hill, Middle Miocene, Kern County; LACM 16762, swollen basal bone.

From LACM locality 1655, Sharktooth Hill, Middle Miocene, Kern County; LACM 15761, swollen basal bone. **Carangidae**.

Genus ***Seriola*** Cuvier 1816

†***Seriola sanctaebarbarae*** Jordan 1921a

Selected Synonymy & References

†***Seriola sanctae-barbarae*** Jordan 1921a:275, pls. 7, 40 (restoration).

†***Hemicaranx archaeus*** Jordan 1927a:8, pl. 2A: David 1943:145.

†***Seriola sanctae-barbarae*** Jordan: David 1943:145, text-fig. 29.

Type Specimen: †***Seriola sanctae-barbarae*** Jordan 1921a, holotype, SU 173 (62), left counterpart, whereabouts unknown.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Holotype of †***Hemicaranx archaeus*** Jordan (1927a): CAS 55643 (SU 455, 174), right counterpart of vertebral column. **Carangidae**.

Referred Specimens in David (1943): All from Lompoc, Monterey Formation, Late Miocene, Santa Barbara County, California; holotype of †***S. sanctae-barbarae***, SU 173 (62), left counterpart; holotype of †***H. archaeus***, CAS 55643 (SU 455, 174), right counterpart of vertebral column; CAS 55500 (SU 170), partial left counterpart; and two specimens whereabouts unknown, USC 205 and an uncatalogued specimen in the office at the Lompoc quarry. **Carangidae**.

Remarks: The hyphen was removed from the species name to comply with Article 27 of the International Code of Zoological Nomenclature [Eschmeyer (1990:253)].

***Seriola* sp.** David 1944:30, pl. 2, figs. 12, 13

Referred Specimens: From Ohio Oil Company "K.C.L.-G." well number 1, Fruitvale District, Early-Middle Miocene (Zemorrian), Kern County; two scales (pl. 2, figs. 12, 13), whereabouts unknown.

Genus ***Trachurus*** Gronow *in* Gray 1854

Trachurus symmetricus (Ayres 1855)

Selected Synonymy & References

Trachurus symmetricus (Ayres 1855): Fitch 1967:19-21.
Trachurus symmetricus (Ayres): Fitch 1968:13.
Trachurus symmetricus (Ayres): Fitch 1969a:72, table 1.
Trachurus symmetricus (Ayres): Fitch and Lavenberg 1971:53.
Trachurus symmetricus (Ayres): Nolf 1985:85.

Type Specimen: Extant, ***Caranx symmetricus*** Ayres 1855, whereabouts unknown (Eschmeyer 1998:1638).

Type Locality: San Francisco Bay, California.

Referred Specimens in Fitch (1967:12, 19-21): On page 12, he makes the general statement that otoliths of ***T. symmetricus*** have been found in several southern California Pliocene and Pleistocene deposits. On pages 19-21, he discussed the similarities and differences in the fish faunas between Pleistocene localities (LACMIP localities 130, 332 and others) and the Pliocene LACMIP locality 435 (= LACM locality 3065 and 3759), Miraleste Canyon, Lomita Marl Formation, Los Angeles County. He concluded that ***T. symmetricus*** was present in most all Pleistocene sites as well as LACMIP locality 435. No specific specimens were mentioned.

Referred Specimens in Fitch (1968:13): He notes that otoliths of ***T. symmetricus*** have been found in several southern California Pliocene and Pleistocene deposits, but they are not abundant in any of them.

Referred Specimens in Fitch (1969a:72, table 1): From LACMIP locality 471 (= LACM locality 802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; 24 otoliths.

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; 31 otoliths.

Referred Specimens in Fitch and Lavenberg (1971:53): Authors note that otoliths of ***T. symmetricus*** have been found in many Pliocene deposits in southern California.

Referred Specimens in Nolf (1985:85): He cites Fitch (1967) that otoliths have been reported from the California Pliocene.

Remarks: Fitch (1967, 1969a) listed otoliths of ***T. symmetricus*** from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but now considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Caristiidae**

Genus †***Absalomichthys*** Whitley 1933

†***Absalomichthys velifer*** (Jordan and Gilbert *in* Jordan 1925)

Figure 77

Selected Synonymy & References

†*Abantis velifer* Jordan and Gilbert *in* Jordan 1925:45-47, pls. 20b, 21 (restoration).
†*Absalomichthys velifer* (Jordan and Gilbert): Whitley 1933:146.
†*Absalomichthys velifer* (Jordan and Gilbert): David 1943:22-24, text-fig. 5, pl. 3.

Type Specimen: †*Abantis velifer* Jordan and Gilbert *in* Jordan 1925, holotype, CAS 55462 (SU 690, 161), left counterpart. **Elephenoridae.**

Type Locality: Santa Monica Mountains, Modelo Formation, Late Miocene, near Van Nuys, Los Angeles County.

Referred Specimens: None.

Referred Specimens in David (1943:22-24, text-fig. 5, pl. 3): From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; two specimens with whereabouts unknown, numbers 3 of the Layton collection, right counterpart (pl. 3) and number 4 of the Layton collection, left counterpart (text-fig. 5).

Remarks: Whitley (1933:146) found †*Abantis* Jordan and Gilbert (1925c) to be a junior synonym because it was preoccupied in two genera of insects. He proposed the replacement name †*Absalomichthys*.

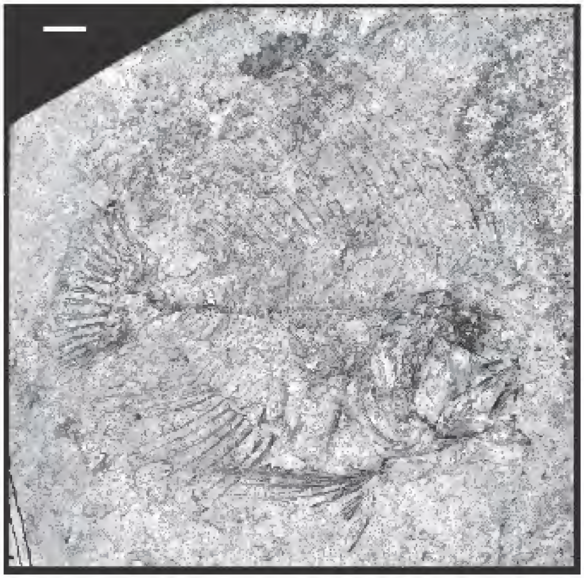


FIGURE 77. †*Absalomichthys velifer* (Jordan and Gilbert *in* Jordan 1925), holotype, CAS 55462 (from color image provided by CAS); scale bar equals 1 cm.

Genus †*Chalcidichthys* David 1943
†*Chalcidichthys malacopterygius* David 1943
Figure 78

Type Specimen: †*Chalcidichthys malacopterygius* David (1943:25-27, pl. 2, fig. 2), holotype, LACM (CIT) 10228, right counterpart. **Caristiidae.**

Type Locality: LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Paratype: From type locality: number 2 of Layton collection, right counterpart, whereabouts unknown.

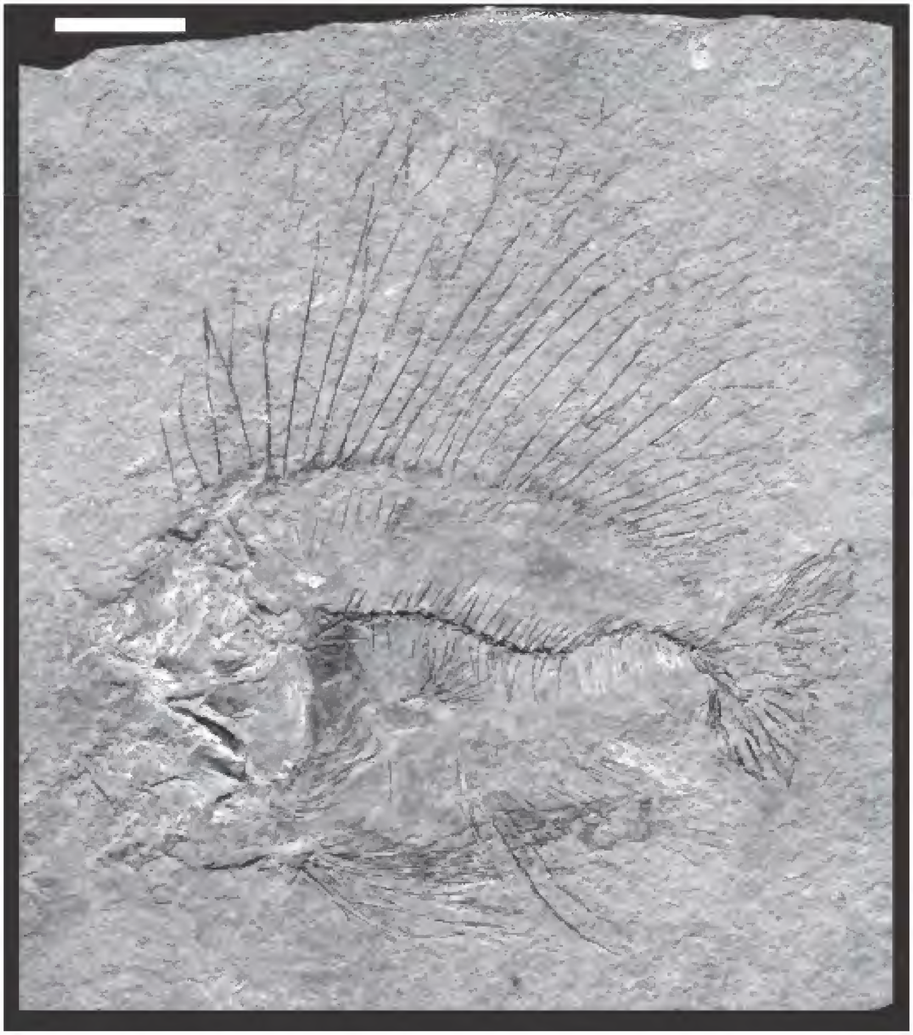


FIGURE 78. †*Chalcidichthys malacopterygius* David 1943, holotype, LACM (CIT) 10228 (from color image provided by LACM); scale bar equals 2 cm.

Family Sparidae

Genus †*Plectrites* Jordan *in* Jordan and Gilbert 1920
†*Plectrites classeni* Jordan *in* Jordan and Gilbert 1920

Figure 79

Selected Synonymy & References

†*Plectrites classeni* Jordan *in* Jordan and Gilbert 1920:29, pl. 18.
†*Plectrites classeni* Jordan: Jordan 1921a:280-281, pl. 45 (restoration).
†*Plectrites classeni* Jordan: Jordan 1925:31-32, pl. 16a.
†*Plectrites classeni* Jordan: David 1943:27-29, text-fig. 6.
†*Rythmias starri* Jordan and Gilbert 1920 [in part]: Jordan 1921a:279-280: David 1943:128-129.

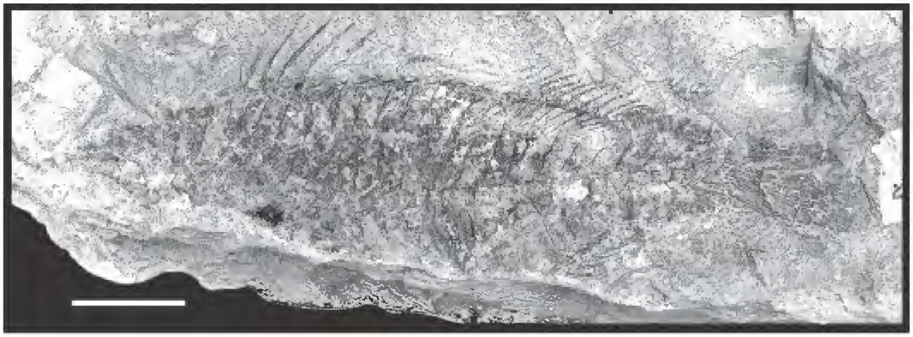


FIGURE 79. †*Plectrites classeni* Jordan *in* Jordan and Gilbert 1920, holotype, CAS 70035 (from color image provided by CAS); scale bar equals 3 cm.

†*Rythmias starri* Jordan and Gilbert 1920 [in part]: Jordan 1927a:10.
†*Plectrites classeni* Jordan: David 1943:138-139.

Type Specimen: †***Plectrites classeni*** **Jordan *in* Jordan and Gilbert 1920, holotype, CAS** 70035 (SU 313, 42), partial right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Referred Specimens in Jordan (1921a): Two specimens with whereabouts unknown, SU 514 and 470 (44).

Referred Specimens in Jordan (1925): CAS 55581 (SU 750, 48), right counterpart.

Referred Specimens in David (1943:27-29: From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10222, left counterpart.

From LACM (CIT) locality 321, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; 10040, right counterpart.

Referred Specimens in David (1943:138-139): From the type locality, SU 512 (43) and 484 (45) referred to †*Rythmias starri* Jordan and Gilbert by Jordan (1921a) and Jordan (1927), respectively, whereabout unknown for both specimens.

From the type locality: SU 470 (44), whereabouts unknown.

From LACM (CIT) locality 332, Sulfur Canyon, Ventura County; one uncatalogued specimen in a private collection, therefore whereabouts unknown.

Remarks: David (1943) listed †*Rythmias starri* described by Jordan (1925:31) in her synonymy, but because Jordan did not mention any specific specimen, we saw no reason to include it. David (1943) reassigned a specimen of †*P. classeni*, CAS 55581, to †*Rythmias starri* (see below).

Genus †*Rythmias* Jordan and Gilbert 1920
†*Rythmias starri* Jordan and Gilbert 1920
Figure 80

Selected Synonymy & References

†*Rythmias starri* Jordan and Gilbert 1920:27-29, pl. 17.
†*Rythmias starri* Jordan and Gilbert: Jordan 1921a:279, pl. 44 (restoration).
†*Rythmias starri* Jordan and Gilbert: Jordan 1925:31.
†*Rythmias starri* Jordan and Gilbert: Jordan 1927a:9-10.
†*Emmachaere rhomalea* Jordan 1925:30 [in part]: David 1943: 139, text-fig. 27b.
†*Plectrites classeni* Jordan *in* Jordan and Gilbert 1920 [in part]: David 1943:139, text-fig. 27a.
†*Rythmias starri* Jordan and Gilbert: David 1943:139-141, text-figs. 27a, 27b.
†*Rythmias starri* Jordan and Gilbert: Frickhinger 1995:841, unnumbered fig.

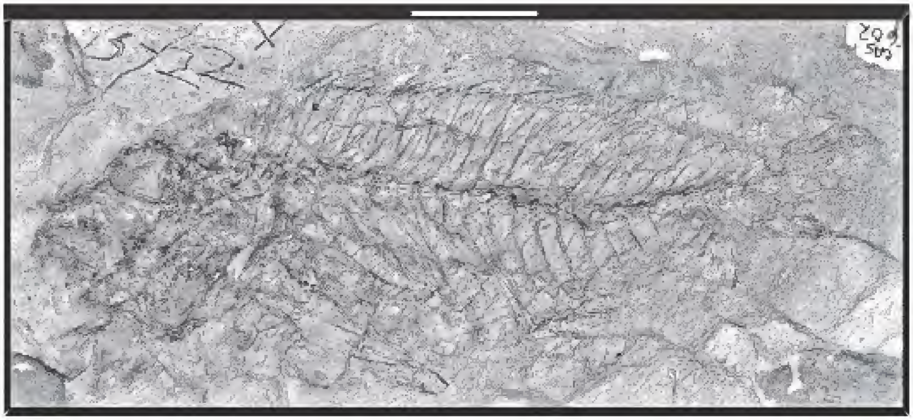


FIGURE 80. †*Rythmias starri* Jordan and Gilbert 1920, holotype, CAS 55602 (from color image provided by CAS); scale bar equals 3 cm.

Type Specimen: †***Rythmias starri*** Jordan and Gilbert 1920, holotype, CAS 55602 (SU 175, 46), nearly complete right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: From type locality: SU 22A and 43, whereabouts unknown.

Referred Specimens in Jordan (1921a): From type locality: five specimens with whereabouts unknown, SU (512, 43), SU 189, 219, 546, and 547.

Referred Specimens in Jordan (1925): Described a specimen from the type locality, but gave no specimen number.

Referred Specimens in Jordan (1927a): SU 484 and SU 464, whereabouts unknown.

Referred Specimens in David (1943): From type locality: CAS 70032 (SU 702, 47), partial right counterpart; CAS 70111 (SU 663, 49), right counterpart [originally referred to †***E. rhomalea*** by Jordan 1925]; 55581 (SU 750, 48), partial right and left counterparts [originally referred to †***Plectrites classeni*** Jordan *in* Jordan and Gilbert 1920], 70033 (SU 52), partial left counterpart; SU (846, 50), partial left counterpart; also SU (637, 51) and SU 53, both with whereabouts unknown.

From type locality: LACM (CIT) 10155, partial left counterpart; SBMNH 116 and 169 both with whereabouts unknown, and two uncatalogued specimens, one in a private collection and the other housed in the USC Zoology Department, whereabouts unknown.

Referred Specimens in Frickhinger (1995): He figured a specimen (no museum number) from the USNM and only gave the locality as California Miocene.

Remarks: David (1943) reassigned a specimen SU (512, 43) referred to †***Rythmias starri*** by Jordan (1921a) to †***P. classeni*** (see above).

†*Rythmias gaviotae* David 1943

Figure 81

Selected References

†*Rythmias gaviotae* David 1943:141-142, text-fig. 27c, pl. 15, fig. 1.

Type Specimen: †***Rythmias gaviotae*** David 1943, holotype, LACM (CIT) 10154, left counterpart.

Type Locality LACM (CIT) locality 364, mouth of Gaviota Canyon, Late Miocene, Santa Barbara County.

Paratypes: Numbers 20, right counterpart and 30 (a large fragment) were in the collection of Dr. Ousdal. Both specimens were housed in the USC Geology Department, but their whereabouts are unknown. Plate 25, fig. 1 gives the specimen number as USC 212, the right counterpart of the holotype.

Referred Specimens: None.

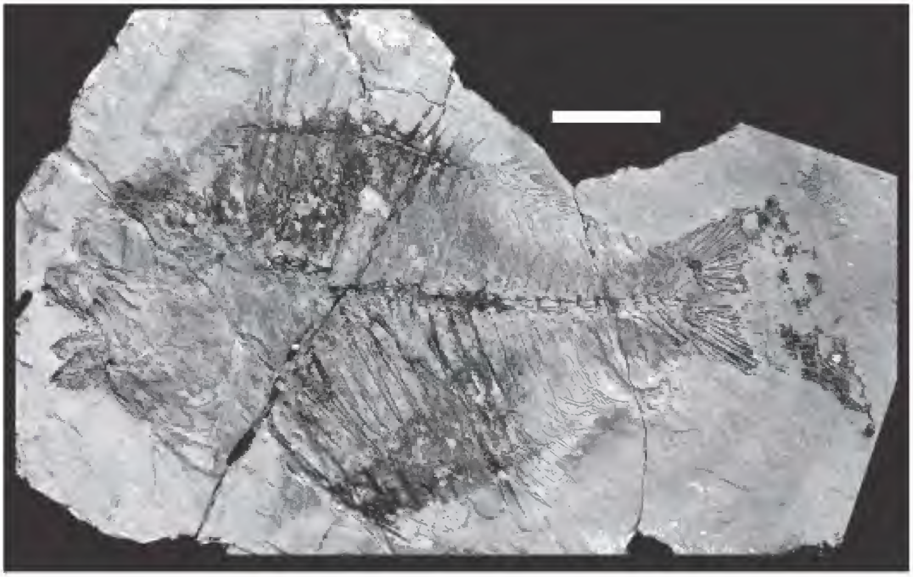


FIGURE 81. †*Rythmias gaviotae* David 1943, holotype, LACM (CIT) 10154 (from color image provided by LACM); scale bar equals 3 cm.

†***Rythmias* sp.**: David 1944:41, pl. 5, fig. 50

Referred Specimen: From Western Gulf Oil Company Symons well no. 12-17, Buena Vista District, San Joaquin Valley, Middle-Late Miocene, Kern County; scale (pl. 5, fig. 50), whereabouts unknown.

Family **Sciaenidae** Cuvier 1829

Genus ***Genyonemus*** Gill 1861b

†***Genyonemus whistleri*** Takeuchi and Huddleston 2008a: 282-285, figs. 3-6.

Figure 82

Type Specimen: †***Genyonemus whistleri*** Takeuchi and Huddleston 2008a, holotype, LACM 144152, left and right counterparts of a skeleton, lacking a portion of the skull, with an incomplete right saccular otolith *in situ*.

Type Locality: LACM locality 6948, upper part of the Puente Formation, early Late Miocene, Los Angeles, Los Angeles County.

Genyonemus lineatus (Ayres 1855)

Selected Synonymy & References

Leiostomus lineatus Ayres 1855:2.
Genyonemus lineatus (Ayres): Fitch 1967:13, 19-21.
Genyonemus lineatus (Ayres): Fitch and Reimer 1967:79, 84-85, fig. 5, table 1.
Genyonemus lineatus (Ayres): Downs 1968:53, text-fig. 25E.
Genyonemus lineatus (Ayres): Fitch 1968:14.

Type Specimen: Extant, ***Leiostomus lineatus*** Ayres 1855, no types known (Eschmeyer 1998:912).

Type Locality: San Francisco Bay, California.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal

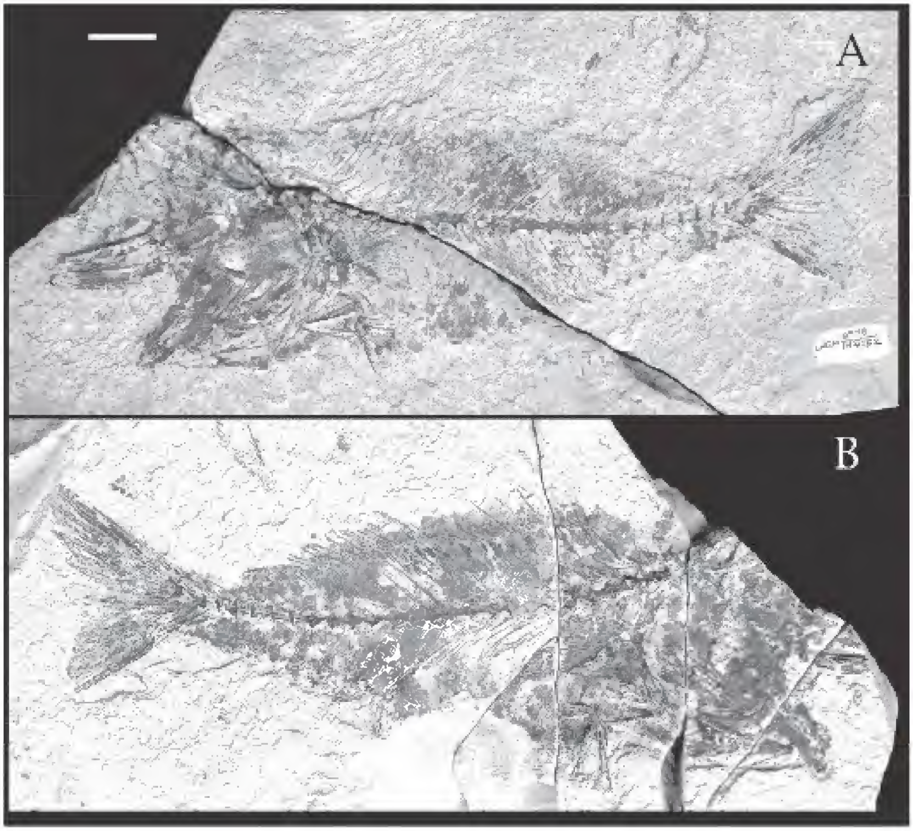


FIGURE 82. †*Genyonemus whistleri* Takeuchi and Huddleston 2008a, holotype, LACM 144152, right counterpart (A), left counterpart (B) [from image provided by Gary Takeuchi (LACM)]; scale bar equals 2 cm.

Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 687 otoliths (see Remarks).

Referred Specimens in Fitch (1967:13, 19-21): On page 13, he noted that otoliths of *G. lineatus* are abundant in southern California and Pleistocene deposits, especially in an unnamed site in the Pliocene San Diego Formation (presumably LACMIP locality 305 [= LACM locality 44213], San Diego, San Diego Formation, Late Pliocene, San Diego County). On pages 19-21, he discussed the similarities and differences in the fish faunas between Pleistocene localities (LACMIP locality 130, 332 and others) and the Pliocene LACMIP locality 435 (= LACM localities 3065, 3759), Miraleste Canyon, Lomita Marl Formation, Los Angeles County. He concluded that *G. lineatus* was present in most all Pleistocene sites as well as LACMIP locality 435. No specific specimens were mentioned (see Remarks).

Referred Specimens in Downs (1968): One otolith (text-fig. 25E). The figure legend lists a general age as Pliocene and Pleistocene for the specimen.

Referred Specimens in Fitch (1968:14): Otoliths of *G. lineatus* are the most abundant fish remains in southern California Pliocene and Pleistocene deposits. They comprise 6,409 of the 11,000 otoliths recovered from the San Diego Formation (presumably LACMIP locality 305 [= LACM locality 44213], San Diego, San Diego Formation, Late Pliocene, San Diego County).

Remarks: Fitch (1967, 1968) listed otoliths of ***M. zonurus*** from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but now considered Pleistocene (Blake 1991; Dibblee 1999).

According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***G. lineatus*** from this locality is questionable.

Genus *Pogonias* Lacepède 1801

†*Pogonias stringeri* Takeuchi and Huddleston 2008b: 71-74, figs. 3, 4

Figure 83

Type Specimen: †***Pogonias stringeri*** Takeuchi and Huddleston 2008b, holotype, LACM 151868, right saccular otolith (figs. 3, 4A, B).

Type Locality: LACM locality 6602, upper Olcese Sand, part of the Temblor Group, late Early Miocene, southeastern San Joaquin Basin, Kern County.

Paratype: LACM 151869, right saccular otolith (figs. 4C, D); LACM 151870, right saccular otolith (figs. 4E, F).

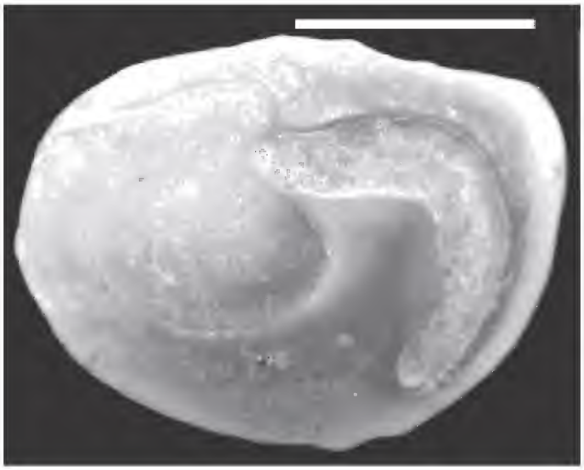


FIGURE 83. †*Pogonias stringeri* Takeuchi and Huddleston 2008b holotype, LACM 151868 [(from image provided by Gary Takeuchi (LACM)]; scale bar equals 5 mm.

Genus *Roncador* Jordan and Gilbert 1880b

Roncador stearnsii (Steindachner 1875)

Selected References

Roncador stearnsii (Steinachner 1875): Fitch and Reimer 1967: 1967:79, 84, 87, fig. 2, table 1.

Type Specimen: Extant, ***Corvina stearnsii*** Steindachner, holotype, MCZ 10840 et al. (Eschmeyer 1998:1602).

Type Locality: San Diego, California.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 15 otoliths (see Remarks).

Distribution of Neogene ***R. stearnsii*** outside of California: None known.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***R. stearnsii*** from this locality is questionable.

Genus *Seriphus* Ayres 1860

†*Seriphus lavenbergi* Huddleston and Takeuchi 2006:34-38, figs. 3, 4

Figure 84

Type Specimen: †*Seriphus lavenbergi* Huddleston and Takeuchi 2006, holotype, LACM 55484, incomplete disarticulated skull with right saccular otolith *in situ*.

Referred Specimens: None.

Type Locality: LACM locality 6907, City of Industry, Yorba Member of the Puente Formation, Late Miocene, Los Angeles County.

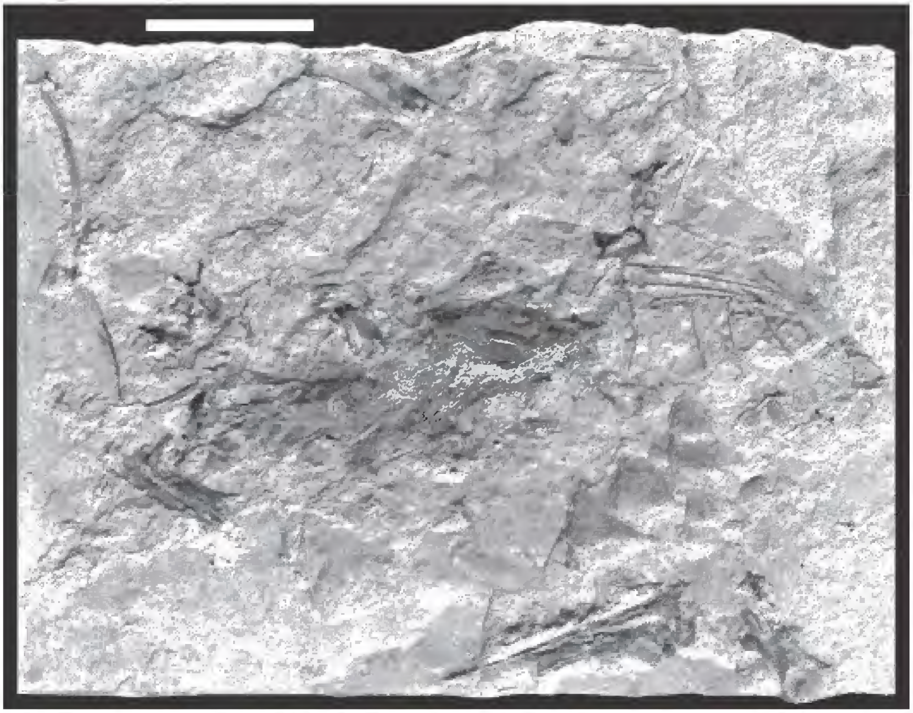


FIGURE 84. †*Seriphus lavenbergi* Huddleston and Tackeuchi 2006 holotype, LACM 55484, [(from image provided by Gary Takeuchi (LACM)]; scale bar equals 2 cm.

Seriphus politus Ayres 1860

Selected References (fossils only)

Seriphus politus Ayres 1860: Fitch 1967:13, 19-21.
Seriphus politus Ayres: Fitch and Reimer 1967:79, 84-86, fig. 8, table 1.
Seriphus politus Ayres: Fitch 1968:14.
Seriphus politus Ayres: Zinsmeister 1970:124, table 1.
Seriphus politus Ayres: Nolf 1985:89.

Type Specimen: Extant, *Seriphus politus* Ayres 1860, no types known (Eschmeyer 1998:1360).

Type Locality: San Francisco Bay, California.

Referred Specimens in Fitch (1967:13, 19-21): On page 13, he makes the general statement that otoliths of *S. politus* have been found in many southern California Pliocene and Pleistocene deposits. On pages 19-21, he discussed the similarities and differences in the fish faunas between Pleistocene localities (LACMIP locality 130, 332 and others) and the Pliocene LACMIP locality 435 (= LACM locality 3065, 3759), Miraleste Canyon, Lomita Marl Formation, Los Angeles County. He concluded that ***S. politus*** was present in most all Pleistocene sites as well as LACMIP locality 435. No specific specimens were mentioned (see Remarks).

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 271 otoliths.

Referred Specimens in Fitch (1968:14): He makes the same general statement as in Fitch (1967:13).

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Nolf (1985:89): He notes that Fitch (1967) reported otoliths of ***S. politus*** from the Pliocene of California.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***S. politus*** from this locality is questionable. LACMIP locality 435 (Lomita Marl), a locality considered Pliocene by Fitch (1967), is now considered of Pleistocene age (Blake 1991; Dibblee 1999), therefore any records of ***S. politus*** from this locality are erroneous.

Genus ***Totoaba*** Villamar 1980

†***Totoaba fitchi*** Huddleston and Takeuchi 2007: 7-11, figs. 4, 5

Figure 85

Type Specimen: †***Totoaba fitchi*** Huddleston and Takeuchi 2007, holotype, LACM 151552, left saccular otolith (fig. 4).

Type Locality: LACM locality 6602, upper Olcese Sand, part of the Temblor Group, late Early Miocene, southeastern San Joaquin Basin, Kern County.

Paratype: LACM 151553, incomplete posterior right saccular otolith (not figured).

Referred Specimens: LACM 151554-151556, left saccular otoliths; LACM 151557; incomplete posterior left saccular otolith; LACM 151558, incomplete posterior right saccular otolith (fig. 5).

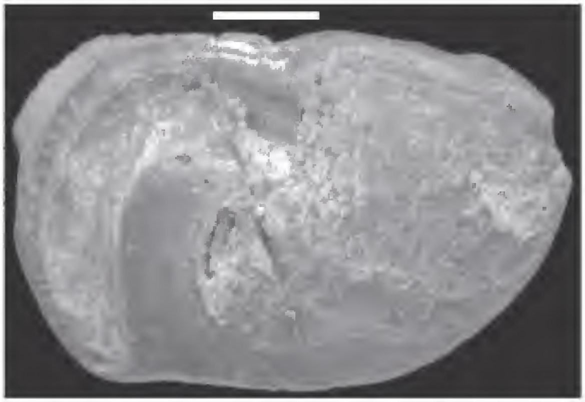


FIGURE 85. †***Totoaba fitchi*** Huddleston and Takeuchi 2007, holotype, LACM 151552, [from image provided by Gary Takeuchi (LACM)]; scale bar equals 5 mm.

Genus †*Lompoquia* Jordan and Gilbert 1919a

†***Lompoquia retropes*** Jordan and Gilbert 1919a

Figure 86

Selected Synonymy & References

- †***Lompoquia retropes*** Jordan and Gilbert 1919:a44, pl. 24.
- †***Lompoquia retropes*** Jordan and Gilbert: Jordan and Gilbert 1920:30, pl. 19.
- †***Lompoquia retropes*** Jordan and Gilbert: Jordan 1921a:281, pl. 47.
- †***Lompoquia retropes*** Jordan and Gilbert: Jordan 1924:47, pl. k.
- †***Lompoquia retropes*** Jordan and Gilbert: Jordan 1925:32.
- †***Atkinsonella strigilis*** Jordan *in* Jordan and Gilbert 1920:41.
- †***Atkinsonella strigilis*** Jordan: Jordan 1921a:281, pls. 5, 41 (restoration).
- †***Lompoquia retropes*** Jordan and Gilbert: David 1943:133-135, text-fig. 26a, pl. 16, fig. 2.
- †***Lompoquia retropes*** Jordan and Gilbert: Pierce 1956:1308, pl. 144, fig. 9.
- †***Lompoquia retropes*** Jordan and Gilbert: Frickhinger:844, unnumbered figure.
- †***Lompoquia retropes*** Jordan and Gilbert: Takeuchi and Huddleston 2008a:279.

Type Specimen: †***Lompoquia retropes*** Jordan and Gilbert 1919a, holotype, CAS 69931 (SU 171, 139), nearly complete left counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Holotype of †***A. strigilis*** Jordan and referred specimens of †***L. retropes*** Jordan and Gilbert in David (1943:134): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55464 (SU 172, 511A), holotype of †***A. strigilis***, specimen in two parts, vertebral column and caudal fin; LACM (CIT) 10201, left counterpart (text-fig. 26a, pl. 16, fig. 2); SU 96 (whereabouts unknown).

Referred Specimens of †***L. retropes*** in Pierce (1956:1308, pl. 144, fig. 9): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3642, scale, whereabouts unknown.

Referred Specimens in Frickhinger (1995:844, unnumbered figure): He figured one specimen, a right counterpart, from the USNM collection. There was no museum number and the locality was given only as Miocene of California.

Referred Specimens of †***L. retropes*** in Takeuchi and Huddleston (2008a:279): Only mentions its presence in the Lompoc deposits.

Distribution of Neogene †*L. retropes* outside of California: None known.

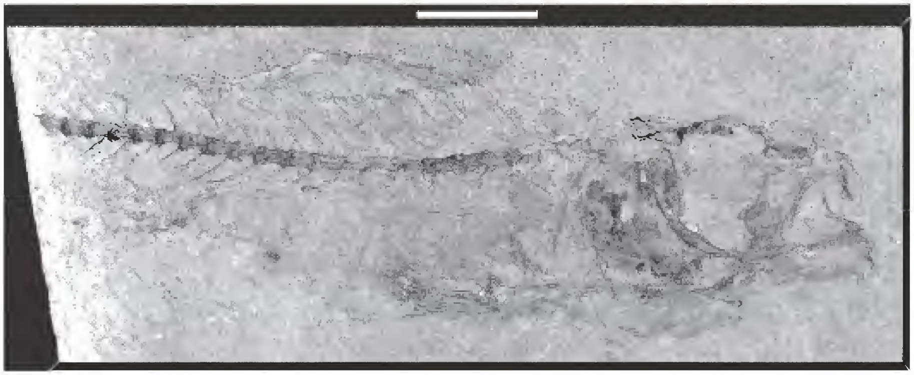


FIGURE 86. †***Lompoquia retropes*** Jordan and Gilbert 1919a, holotype, CAS 69931 (from color image provided by CAS); scale bar equals 3 cm.

†*Lompoquia culveri* (Jordan 1925)

Figure 87

Selected Synonymy & References

†***Turio culveri*** Jordan 1925: 23-24, pl. 10b.
†***Lompoquia culveri*** (Jordan): David 1943:134-136, text-fig. 26b.
†***Lompoquia* cf. *culveri*** (Jordan): David 1944:39, 41, pl. 4, fig. 40, pl. 5, figs. 51, 51a.
†***Lompoquia culveri*** (Jordan): Pierce 1956: 1308, pl. 144, fig. 11.
†***Lompoquia culveri*** (Jordan): Takeuchi and Huddleston 2008a:279.

Type Specimen: †***Turio culveri*** Jordan 1925, holotype, CAS 55529 (SU 16, 672), fairly complete left counterpart. **Zaphlegidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan (1925): From type locality: CAS 55485 (SU 695, 182), headless left counterpart.

Referred Specimens in David (1943): From type locality: five specimens (all whereabouts unknown), SU 17 (462), 18 (463), 19 (613), and 20 (457), and SBMNH 164.

Referred Specimen of †*L.* cf. *culveri* (Jordan) in David (1944): From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene (Mohnian), Los Angeles County; scale (pl. 4, fig. 40), whereabouts unknown; two scales (pl. 5, figs. 51, 51a), whereabouts unknown.

Referred Specimens of †*L. culveri* in Pierce (1956:1308, pl. 144, fig. 9): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3641, scale, whereabouts unknown.

Referred Specimens of †*L. culveri* (Jordan) in Takeuchi and Huddleston (2008a): Only mentions its presence in the Lompoc deposits.

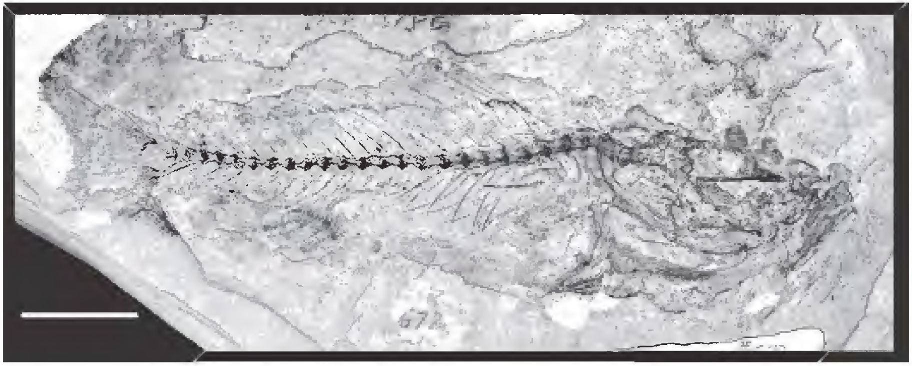


FIGURE 87. †*Lompoquia culveri* (Jordan 1925), holotype, CAS 55529 (from color image provided by CAS); scale bar equals 5 cm.

†*Lompoquia* sp.

Selected References

†***Lompoquia*** **sp.**: David 1943:29, 75.
†***Lompoquia*** **sp.**: David 1944:39, 41: pl. 4, fig. 39, pl. 5, fig. 53.
†***Lompoquia*** **sp.**: Huddleston and Takeuchi 2006:30, 33, table 1.
†***Lompoquia*** **sp.**: Takeuchi and Huddleston 2008a:279,284, table 4.

Referred Specimens in David (1943:29): From Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; no specific specimens, only fragmentary material (unfigured).

Referred Specimens in David (1943:75): From LACM (CIT) locality 382, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10031, counterpart of caudal fin.

From LACM locality 1039, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; LACM 1192, counterpart of a vertebral segment.

From Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; CAS 55591 (SU 88), counterpart of badly preserved head and anterior vertebrae.

Referred Specimens in David (1944): From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Middle-Late Miocene (Mohnian), Los Angeles County; two scales (pl. 4, fig. 39, pl. 5, fig. 53), whereabouts unknown.

Referred Specimens in Huddleston and Takeuchi (2006:30, 33, table 1): No specific specimens mentioned except, (1) that Fitch and Reimer (1967) collected otoliths of ***Seriphus*** in the Fernando Formation and (2) Huddleston and Takeuchi (2006) listed †***Lompoquia*** and †***S. lavenbergi*** among the ichthyofauna of LACM locality 6907.

Referred Specimens in Takeuchi and Huddleston (2008:table 4): From LACM locality 6948, upper part of the Puente Formation, early Late Miocene, Los Angeles, Los Angeles County; no specific specimen indicated.

Genus *Cynoscion* Gill 1861b
†*Cynoscion eprepes* (Jordan 1921a)
Figure 88

Selected Synonymy & References

†***Aristoscion eprepes*** Jordan 1921a:282, pls. 6, 48 (restoration).
†***Cynoscion eprepes*** (Jordan): David 1943:136-138, pl. 16, figs., 3, 4.
†***Cynoscion eprepes*** (Jordan): Takeuchi and Huddleston 2008a:279.

Type Specimen: †***Aristoscion eprepes*** Jordan 1921a, holotype, CAS 55623 (SU 522, 54), headless right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Referred Specimens in David (1943): From type locality: three specimens with whereabouts unknown, SU 55, headless specimen and two uncatalogued left counterparts (pl. 16, fig. 4). One specimen was housed in the office of the Kelco (Dicalite) Company, Los Angeles (Walteria?) and the other was owned by Mr. Arnold Fitger, Los Angeles (pl. 16, fig. 3).

Referred Specimens in Takeuchi and Huddleston (2008a): Only mentions its presence in the Lompoc deposits.

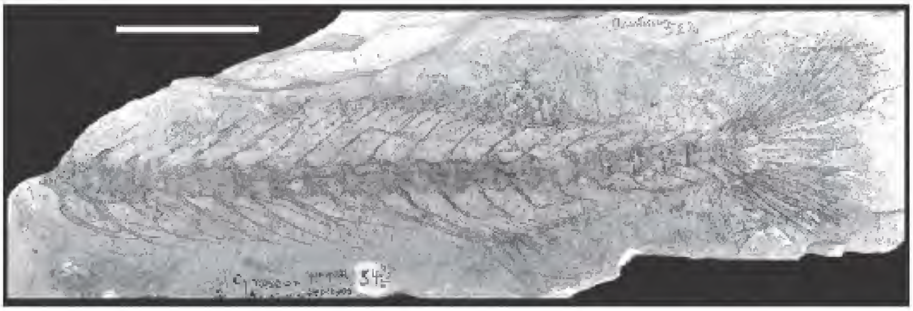


FIGURE 88. †*Cynoscion eprepes* (Jordan 1921a), holotype, CAS 55623 (from color image provided by CAS); scale bar equals 10 cm.

Genus *Atractoscion* Gill 1862
Atractoscion nobilis (Ayres 1860)

Selected Synonymy & References

Johnius nobilis Ayres 1860:77.
Cynoscion nobilis (Ayres): Miller and Lea 1972:154.

Cynoscion nobilis (Ayres): Fitch and Lavenberg 1971:120.
Atractoscion nobilis (Ayres): Eschmeyer and Herald 1983:219.

Type Specimen: Extant, ***Johnius nobilis*** Ayres 1860, no types known (Eschmeyer 1998:1193).
Type Locality: San Francisco Bay, California.
Referred Specimens in Fitch and Lavenberg (1971:120): Fossil otoliths of ***C. nobilis*** have been found in a Pliocene exposure, San Diego, California (presumably LACMIP locality 305 [= LACM locality 44213], San Diego, San Diego Formation, Late Pliocene, San Diego County). No other information given.
Remarks: The references of Miller and Lea (1972) and Eschmeyer and Herald (1983) are included to show the change in generic name.

Family †**Ioscionidae** David 1943

Genus †***Ioscion*** Jordan 1921a
†***Ioscion morgani*** Jordan 1921a

Selected Synonymy & References
†***Ioscion morgani*** Jordan 1921a:283, pls. 8a, 49a (restoration).
†***Ioscion morgani*** Jordan: David 1943:149-150, text-fig. 31.

Type Specimen: †***Ioscion morgani*** Jordan 1921a, holotype, SU 541 (175), left headless counterpart, whereabouts unknown. **Otolithidae**.
Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.
Referred Specimens: None.
Referred Specimens in David 1943: Only the holotype is examined. **Ioscionidae**.
Remarks: David (1943:150) noted that the specimen is difficult to classify. It differs morphologically from any living family, but it is probably related to the carangid-like fishes.

Family **Embiotocidae**

Genus ***Amphistichus*** Agassiz 1854
Amphistichus argenteus Agassiz 1854

Type Specimen: Extant, ***Amphistichus argenteus*** Agassiz, no type known (Eschmeyer 1998:132).
Type Locality: San Francisco, California.
Referred Specimens in Fitch and Lavenberg (1971:65): No specific specimens, however they note otoliths of ***A. argenteus*** have been identified from Pliocene deposits near San Diego (presumably LACMIP locality 305 [= LACM locality 44213], San Diego, San Diego Formation, Late Pliocene, San Diego County) and San Pedro, California (presumably LACMIP locality 435 [= LACM locality 3065, 3759], Miraleste Canyon, Lomita Marl Formation, Pleistocene [Irvingtonian], Los Angeles County) (see Remarks).
Remarks: LACMIP locality 435 (Lomita Marl), a locality Fitch and Lavenberg (1971) believed was of Pliocene age, is now considered Pleistocene (Blake 1991; Dibblee 1999).

Genus ***Cymatogaster*** Gibbons 1854
Cymatogaster aggregata Gibbons 1854

Selected References
Cymatogaster aggregata Gibbons 1854: Fitch 1967:13.
Cymatogaster aggregata Gibbons: Fitch and Reimer 1967:79, 84, 86, fig. 1, table 1.
Cymatogaster aggregata Gibbons: Downs 1968:53, text-fig. 25D.
Cymatogaster aggregata Gibbons: Fitch 1968:14
Cymatogaster aggregata Gibbons: Zinsmeister 1970:123, table 1.

Cymatogaster aggregata Gibbons: Fitch and Lavenberg 1975:55.
Cymatogaster aggregata Gibbons: Nolf 1985:90.

Type Specimen: Extant, ***Cymatogaster aggregata*** Gibbons, no types known (Eschmeyer 1998:55).

Type Locality: San Francisco Bay, California.

Referred Specimens in Fitch (1967:13): Although otoliths of ***C. aggregata*** have been found in many southern California Pliocene and Pleistocene deposits, they usually make up less than 10% of the otoliths recovered.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 10 otoliths (see Remarks).

Referred Specimens in Downs (1968): One otolith (text-fig. 25D). The figure legend gives the general age as Pliocene and Pleistocene for the specimen. No locality data.

Referred Specimens in Fitch (1968:14): He notes that otoliths of ***C. aggregata*** are abundant in most southern California Pliocene and Pleistocene deposits.

Referred Specimens in Zinsmeister (1970): From LACMIP locality 471 (= LACM locality 3802), Uppper Newport Bay, Fernando Formation, Plio-Pleistocene, Orange County; no specific specimens listed. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Fitch and Lavenberg (1975:55): No specific specimens, but otoliths of ***C. aggregata*** are found in many west coast deposits of Pliocene age.

Referred Specimens in Nolf (1985:90): He notes that Fitch (1967) reported otoliths of ***C. aggregata*** from the Pliocene of California.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***C. aggregata*** from this locality is questionable.

Genus ***Embiotoca*** Agassiz 1853
Embiotoca jacksoni Agassiz 1853

Type Specimen: Extant, ***Embiotoca jacksoni*** Agassiz, syntypes ?NMW 20040-43 (Eschmeyer 1998:797).

Type Locality: San Francisco, California.

Referred Specimens in Fitch and Lavenberg (1975:57): otoliths of ***E. jacksoni*** have been found in several Pliocene deposits.

Remarks: Because no specific locality was given, the presence of ***E. jacksoni*** in the Neogene of California is questionable.

Genus ***Damalichthys*** Girard 1855
†***Damalichthys saratogensis*** Casteel 1978

Selected References

†***Damalichthys saratogensis*** Casteel 1978:293-298; figs., 1A, B.

Type Specimen: †***Damalichthys saratogensis*** Casteel 1978, holotype, USNM 184090, complete inferior pharyngeal (fig. 1A), whereabouts unknown. **Embiotocidae**.

Type Locality: USGS vertebrate locality M-1219, Santa Clara Formation, Plio-Pleistocene, Saratoga, Santa Clara County.

Paratype: USNM 184089, inferior pharyngeal (fig. 1B), from type locality.

Referred Specimens: From type locality, no museum numbers: seven scales, two pharyngeal teeth, two opercular fragments, six atlas and two caudal vertebrae, and two fragments of the dentigerous portion of pharyngeals.

Remarks: The holotype could not be located in the collection of the USNM or its satellite depository at USGS (Denver) (emails dated March 10, 2011, one from Mark Florence (USNM) and another from Kevin McKinney [USGS]).

Genus †*Eriquius* Jordan 1924
†*Eriquius plectrodes* Jordan 1924
Figure 89

Selected Synonymy & References
†***Eriquius plectrodes*** Jordan 1924:44-45, pl. H.
†***Eriquius plectrodes*** Jordan: Jordan 1925:30-31, pl. 15 (restoration).
†***Eriquius plectrodes*** Jordan: David 1943:143-144; text-fig. 28.
†***Erisceles pristinus*** Jordan 1925:33-34, pl. 17: David 1943:143.

Type Specimen: †***Erisceles plectrodes*** Jordan 1924, holotype, CAS 70084 (SU 204, 602), right counterpart (pl. H) (see Remarks). **Sparidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: None.

Referred Specimens in Jordan (1925): None. Gives a detailed description of the holotype and presents a restoration (pl. 15) of the species. **Sparidae.**

Holotype and Referred Specimen of †*E. pristinus* reidentified as †*E. plectrodes* in David (1943): From type locality: holotype, CAS 70085 (SU 205, 751), partial left counterpart; CAS 55605 (SU 218, 610), partial right counterpart (fig. 28 in part). **Embiotocidae.**

Remarks: The type specimen in Jordan (1924:45, pl. H) is shown upside down.

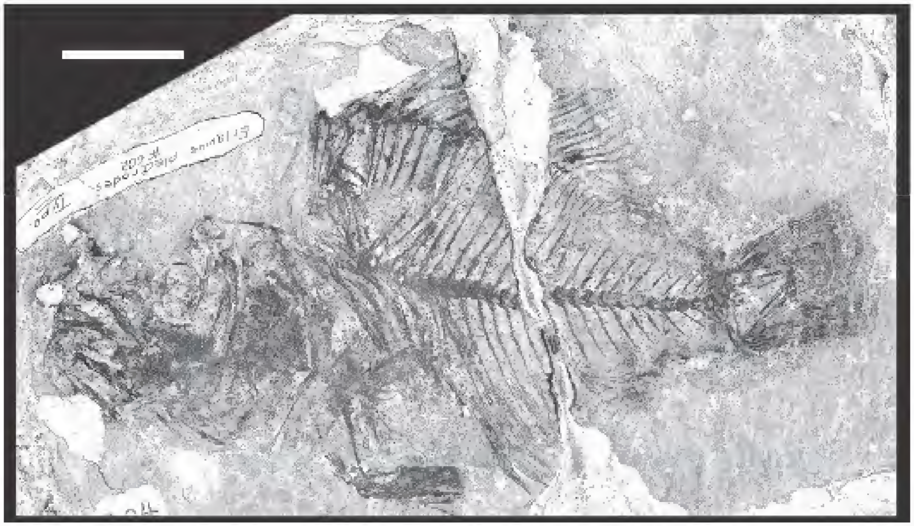


FIGURE 89. †*Eriquius plectrodes* Jordan 1924, holotype, CAS 70084 (from color image provided by CAS); scale bar equals 5 cm.

Genus *Hysterocarpus* Gibbons 1854
Hysterocarpus traskii Gibbons 1854

Selected References (fossils only)
Hysterocarpus traskii Gibbons: Casteel 1978:294

Type Specimen: Extant, ***Hysterocarpus traskii*** Gibbons, no type known (Eschmeyer 1998:1690).

Type Locality: Sacramento Bay or Sacramento River, California (Eschmeyer 1998: 1690).

Referred Specimens in Casteel (1978:294): He mentions (without a citation) that ***H. traskii*** is known from the Cache Formation, Plio-Pleistocene, Lake County. Most likely he is referring to the specimens listed below as ***Hysterocarpus*** **cf.** ***H. traskii***.

Hysterocarpus* cf. *H. traskii Gibbons 1854

Selected References (fossils only)

Hysterocarpus* cf. *H. traskii Gibbons: Casteel and Rymer 1980:232, table 31

Referred Specimens in Casteel and Rymer (1980:232, table 31): From USGS vertebrate locality M-1354, Cache Formation, Plio-Pleistocene, Lake County; USNM 264246, two scales and one pharyngeal plate.

From USGS vertebrate locality M-1350, Cache Formation, Plio-Pleistocene, Lake County; USNM 252776, one scale fragment, one pharyngeal tooth.

Genus ***Rhacochilus***

Rhacochilus vacca (Girard 1855)

Selected Synonymy & References

Damalichthys vacca Girard 1855:320.
Rhacochilus vacca (Girard): Fitch 1967:13.
Rhacochilus vacca (Girard): Nolf 1985:90.

Type Specimen: Extant, ***Damalichthys vacca*** Girard 1855, syntype, USNM 548 (Eschmeyer 1998:1733).

Type Locality: Fort Steilacoom, Puget Sound, Washington.

Referred Specimens in Fitch (1967:13): No specific specimens. He mentions that remains of ***R. vacca***, mostly otoliths and pharyngeal teeth, have been found in several southern California Pliocene and Pleistocene deposits (see Remarks).

Referred Specimens in Nolf (1985:90): He cites Fitch (1967) that otoliths of ***R. vacca*** have been reported from the California Pliocene (see Remarks).

Remarks: Because no specific locality was given, the presence of ***R. vacca*** in the Neogene of California is questionable.

Family **Embiotocidae** genus and species undetermined

Referred Specimens in Fitch and Reimer (1967:79, 84, 86, table 1): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 2 otoliths (unfigured).

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of **Embiotocidae** genus and species undetermined from this locality is questionable.

Family **Labridae**

Genus ***Halichoeres*** Rüppell 1835

Halichoeres semicinctus (Ayres 1859)

Type Specimen: Extant, ***Julius semicinctus*** Ayres 1859, holotype lost (Eschmeyer 1998:1535).

Type Locality: Cedros Island, Baja California, Mexico.

Referred Specimens in Fitch and Lavenberg (1975:78): They state that there is an imprint of bony remains of a fossil labrid from the Miocene Altimira shale in Palos Verdes, Los Angeles County, however it may not be from ***H. semicinctus***.

Genus ***Oxyjulis*** Gill 1863
Oxyjulis californica (Günther 1861)

Selected Synonymy & References

Halichoeres californicus Günther 1861:386.
Oxyjulis californica (Günther): Fitch 1967:14.
Oxyjulis californica (Günther): Fitch 1968:16.
Oxyjulis californica (Günther): Fitch and Lavenberg 1975:80.
Oxyjulis californica (Günther): Nolf 1985:93.

Type Specimen: Extant, ***Halichoeres californicus*** Günther (1861:386), syntypes USNM 706-707 (Eschmeyer 1998:309).

Type Locality: Monterey, California.

Referred Specimens in Fitch (1967:14): No specific specimens. He states that otoliths of ***O. californica*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch (1968:16): Same information as in entry above of Fitch (1967).

Referred Specimens in Fitch and Lavenberg (1975:80): Otoliths of ***O. californica*** have been found in several Pliocene and Pleistocene deposits in California.

Referred Specimens in Nolf (1985:93): Cites Fitch (1967) that otoliths have been reported from the Pliocene of California.

Remarks: Because Fitch (1967, 1968) and Fitch and Lavenberg (1975) did not give any specific fossil locality containing otoliths of ***O. californica***, its presence in the Neogene of California is questionable.

Genus ***Semicossyphus*** Günther 1861
Semicossyphus pulcher (Ayres 1854)

Selected Synonymy & References

Labrus pulcher Ayres 1854:174
Pimelometopon pulchrum (Ayres): Fitch 1968:16.
Pimelometopon pulchrum (Ayres): Fitch and Lavenberg 1971:88
Semicossyphus pulcher (Ayres): Eschmeyer and Herald 1983: 237

Type Specimen: Extant, ***Labrus pulcher*** Ayres 1854, no types known (Eschmeyer 1995:1394).

Type Locality: San Diego, California.

Referred Specimens in Fitch (1968:16): He notes that remains of ***S. pulcher*** (= ***P. pulchrum***), primarily jaw and pharyngeal teeth, have been found in many southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch and Lavenberg (1971:88): No specific specimens are mentioned, however they note fossilized jaw and pharyngeal teeth of sheepshead (= ***S. pulcher?***) have been found in many Pliocene deposits in southern California, and the jaw teeth of ***S. pulcher*** (= ***P. pulchrum***) have been recovered from Miocene deposits.

Remarks: Because Fitch (1968) and Fitch and Lavenberg (1971) did not give any specific fossil locality containing otoliths of ***S. pulcher***, its presence in the Neogene of California is questionable.

Suborder **Zoarcoidei**

Family **Bathymasteridae**

Genus ***Rathbunella*** Jordan and Evermann 1896a

Selected Synonymy & References

Bathymaster hypoplectus Gilbert (1890:97).
Rathbunella hypoplecta (Gilbert 1890): Eschmeyer and Herald 1983:239.
Rathbunella hypoplecta (Gilbert 1890): Fitch and Lavenberg (1975:26).

Type Specimen: Extant, ***Bathymaster hypoplectus*** Gilbert (1890:97), holotype, USNM 44380 (Eschmeyer 1998:755).

Type Locality: Off southern California.

Referred Specimens in Fitch and Lavenberg (1975:26): They state that otoliths of ***R. hypoplecta*** have been found in Pliocene deposits near San Pedro, Los Angeles County.

Remarks: Because Fitch and Lavenberg (1975) did not give any specific fossil locality containing otoliths of ***R. hypoplecta***, its presence in the Neogene of California is questionable, especially since the one Pliocene locality near San Pedro that is usually cited, LACMIP locality 435 (Lomita Marl) is now considered Pleistocene (Blake 1991; Dibblee 1999).

Family **Zoarcidae**

Genus ***Lycodes*** Reinhardt 1831

Lycodes pacificus Collett 1879

Selected Synonymy & References

Lycodes pacificus Collett 1879.
Lycodopsis pacifica (Collett): Fitch 1967:17, 19-21.
Lycodopsis pacifica (Collett): Fitch 1968:23.
Lycodopsis pacifica (Collett): Zinsmeister 1970:124, table 1.
Lycodopsis pacifica (Collett): Nolf 1985:62.
Lycodes pacificus Collett: Eschmeyer 1998:1267.

Type Specimen: Extant, ***Lycodes pacificus*** Collett, holotype, ZMB 8280 (Eschmeyer 1998:1267).

Type Locality: Off Japan (Eschmeyer 1998:1267).

Referred Specimens in Fitch (1967:17, 19-21): Fitch (1967:17) makes the general statement that otoliths of *L. pacifica* (= *L. pacificus*) have been found in several southern California Pliocene and Pleistocene deposits (see Remarks).

Referred Specimens in Fitch (1968:23): Same general statement as Fitch (1967:17).

Referred Specimens in Zinsmeister (1970): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; present in fauna as otoliths and/or teeth, but does not state which one(s).

Referred Specimens in Nolf (1985): He notes that otoliths of ***L. pacifica*** (= ***L. pacificus***) were reported from the Pliocene of California by Fitch (1967).

Remarks: Fitch and Lavenberg (1968:78) made the general statement that zoarcid otoliths have been found in several Pliocene deposits in Southern California. On pages 19-21, Fitch (1967) identified one of the Pliocene localities as: LACMIP locality 435 (= LACM localities 3065, 3759), Miraleste Canyon, Lomita Marl Formation, Los Angeles County. The Lomita Marl is now considered Pleistocene in age (Blake 1991; Dibblee 1999).

Family **Cryptacanthodidae**

Genus ***Cryptacanthodes*** Storer 1839

Cryptacanthodes aleutensis (Gilbert 1896)

Selected Synonymy & References

Lyconectes aleutensis Gilbert 1896:542.
Lyconectes aleutensis Gilbert: Fitch 1967:19-21.
Lyconectes aleutensis Gilbert: Fitch 1968:23.
Lyconectes aleutensis Gilbert: Nolf 1985:97.
Cryptacanthodes aleutensis (Gilbert): Eschmeyer 1998:72.

Type Specimen: Extant, ***Lyconectes aleutensis*** Gilbert 1896, holotype, USNM 48620 (Eschmeyer 1998:72).

Type Locality: North of Unalaska Island.

Referred Specimens in Fitch (1968:23): Otoliths of ***C. aleutensis*** (= ***L. aleutensis***) have been found in several southern California Pliocene and Pleistocene deposits (see Remarks).

Referred Specimens in Nolf (1985:97): Cites Fitch (1967) that otoliths are known from the Pliocene of California (see Remarks).

Remarks: Fitch (1967:19-21) reported otoliths of ***C. aleutensis*** from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but is now considered Pleistocene (Blake 1991; Dibblee 1999). Because LACMIP locality 435 was the only specific locality identified, the presence of otoliths of ***C. aleutensis*** in the California Neogene is questionable.

Family **Zaproridae**

Genus †***Araeosteus*** Jordan and Gilbert 1920

†***Araeosteus rothi*** Jordan and Gilbert 1920

Figure 90

Selected Synonymy & References

†***Araeosteus rothi*** Jordan and Gilbert 1920:25, pl. 14.
†***Araeosteus rothi*** Jordan and Gilbert: Jordan 1921a:291, pl. 49 (restoration).
†***Araeosteus rothi*** Jordan and Gilbert: Jordan 1925:35.
†***Araeosteus rothi*** Jordan and Gilbert: David 1943:38-41, text-fig. 8.
†***Zemiagrammus isistius*** Jordan 1921: Jordan 1925:35.

Type Specimen: †***Araeosteus rothi*** Jordan and Gilbert 1920, holotype, CAS 55519 (SU 93, 315), right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: SU 11, right counterpart, whereabouts unknown, figured as "undetermined" in Jordan and Gilbert (1919a, pl. 23, fig. 3).

Referred Specimens in Jordan (1921a): the two specimens mentioned above only. **Zaproridae(?)**.

Referred Specimens and Holotype of †*Zemiagrammus isistius* reidentified by Jordan (1925): From Lompoc: two specimens with whereabouts unknown, SU 202 (700) and 313; and CAS 55537 (SU 203, 544), holotype of †***Z. isistius***, partial left counterpart. **Hexagrammidae.**

Referred Specimens in David (1943:38-41): From LACM (CIT) locality 317, Sepulveda Canyon, Modelo Formation, Late Miocene, Los Angeles County; LACM (CIT) 10220, right counterpart; LACM (CIT) 10053, partial counterpart. **Zaproridae.**

Referred Specimens in David (1943:75): From LACM (CIT) locality 381, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; one uncatalogued specimen. Zaproridae.

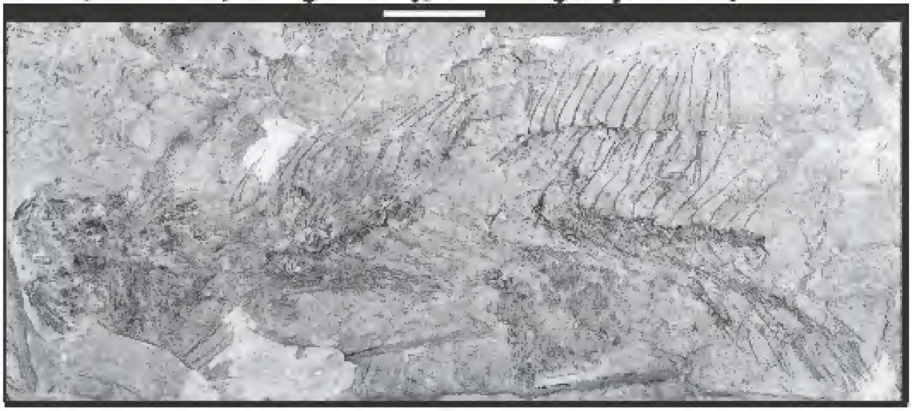


FIGURE 90. †***Araeosteus rothi*** Jordan and Gilbert 1920, holotype, CAS 55519 (from color image provided by CAS); scale bar equals 3 cm.

Referred Specimens in David (1943:158): All from Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55519 (SU 93, 315), holotype; CAS 55519 (SU 93, 315); SU 202 (700), whereabouts unknown; CAS 55537 (SU 203, 544) holotype of †***Z. isistius***, partial left countrpart. **Zaproridae.**

Family **Ammodytidae**

Genus ***Ammodytes*** Linnaeus 1758
Ammodytes hexapterus Pallas 1814

Selected References (fossils only)

Ammodytes hexapterus Pallas 1814: Fitch 1967:19-21.
Ammodytes hexapterus Pallas: Fitch 1968:24.
Ammodytes hexapterus Pallas: Nolf 1985:98.

Type Specimen: Extant, ***Ammodytes hexapterus*** Pallas 1814, no types known (Eschmeyer 1998:729).

Type Locality: Circumborealis; Kamchatka, Russia; north Kurile Island.

Referred Specimens in Fitch (1968:24): He mentions no specific specimens, but notes that otoliths of ***A. hexapterus*** have been found in several southern California Pliocene and Pleistocene deposits.

Referred Specimens in Nolf (1985:98): Notes that Fitch (1968) reports otoliths of ***A. hexapterus*** from the Pliocene of California.

Remarks: Fitch (1967:19-21) reported otoliths of ***A. hexapterus*** from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but is now considered Pleistocene (Blake 1991; Dibblee 1999). Because LACMIP locality 435 was the only specific locality identified with otoliths of ***A. hexapterus***, its presence in the California Neogene is questionable.

Suborder **Gobiesocoidei**

Family **Gobiesocidae**

Genus †***Bulbiceps*** Jordan 1919
†***Bulbiceps raninus*** Jordan 1919

Selected Synonymy & References

†***Bulbiceps raninus*** Jordan 1919:12, pl. 6 (restoration).
†***Bulbiceps raninus*** Jordan: Jordan 1921a:291.

Type Specimen: †***Bulbiceps raninus*** Jordan 1919, holotype, SU 58, right counterpart, whereabouts unknown. **Liparidae.**

Type Locality: Soledad Pass, Miocene, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1921a): None, just discussed the holotype. **Gobiesocidae?**

Suborder **Gobioidei**

Family **Gobiidae**

Genus ***Lepidogobius*** Gill 1859b
Lepidogobius lepidus (Girard (1858)

Selected Synonymy & References

Gobius lepidus Girard 1858:127.
Lepidogobius lepidus (Girard): Fitch and Reimer 1967.

Type Specimen: Extant, ***Gobius lepidus*** Girard, syntypes, USNM 361 and 362 (Eschmeyer 1998:892).

Type Locality: San Francisco, California.

Referred Specimens in Fitch and Reimer (1967:79, 84, 87, table 1, fig. 7): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; six otoliths (one as fig. 18) (see Remarks).

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***G. lepidus*** from this locality is questionable.

Genus ***Lethops*** Hubbs 1926
Lethops connectens Hubbs 1926

Selected References (fossils only)

Lethops connectens Hubbs 1926: Fitch 1968:21.
Lethops connectens Hubbs: Nolf 1985:99.

Type Specimen: Extant, ***Lethops connectens*** Hubbs 1926, holotype, UMMZ 63281 (Eschmeyer 1998:407).

Type Locality: Carmel Bay, California.

Referred Specimens in Fitch (1968:21): Otoliths of ***L. connectens*** have been found in several Pliocene and Pleistocene deposits in California.

Referred Specimens in Nolf (1985:99): He cites Fitch (1964, but should have cited 1968) that otoliths of ***L. connectens*** have been reported from Pliocene deposits in California.

Remarks: Because Fitch (1968) did not give any specific fossil locality containing otoliths of ***L. connectens***, its presence in the Neogene of California is questionable.

Genus ***Rhinogobiops*** Hubbs 1926
Rhinogobiops nicholsii (Bean 1882)

Selected Synonymy & References

Gobius nicholsii Bean 1882.
Coryphopterus nicholsii (Bean): Fitch 1967:16, 19-21.
Coryphopterus nicholsii (Bean): Fitch 1968:21.
Coryphopterus nicholsii (Bean): Fitch and Lavenberg 1975:67.
Coryphopterus nicholsii (Bean): Nolf 1985:99.
Rhinogobiops nicholsii (Bean): Nelson et al. 2004:247.

Type Specimen: Extant, ***Gobius nicholsii*** Bean 1882, holotype, USNM 29803 (Eschmeyer 1998:1169).

Type Locality: Departure Bay, British Columbia, Canada.

Referred Specimens in Fitch (1967:16, 19-21): From LACMIP locality 305 (= LACM locality 44213), San Diego, San Diego Formation, Late Pliocene, San Diego County; otoliths present, no specific specimens.

Referred Specimens in Fitch (1968:21): He makes the general statement that otoliths of ***C. nicholsii*** (= ***R. nicholsii***) were found in many southern California Pliocene and Pleistocene deposits, with over 1,700 being recovered from the Lomita Marl Pliocene, San Pedro (see Remarks).

Referred Specimens in Fitch and Lavenberg (1975:67): They make the general statement that otoliths of ***R. nicholsii*** were present in several Pliocene deposits in California.

Referred Specimens in Nolf (1985:99): He cites Fitch (1967) that otoliths of ***R. nicholsii*** are known from the Pliocene of California.

Distribution of Neogene ***R. nicholsii*** outside of California: None known.

Remarks: Fitch (1967, 1968) listed otoliths of ***C. nicholsii*** (= ***R. nicholsii***) from LACMIP locality 435 (Lomita Marl), a locality he believed was of Pliocene age, but now considered Pleistocene (Blake 1991; Dibblee 1999).

Suborder **Scombroidei** *sensu* Orrell et al. 2006

Family †**Euzaphlegidae** Danil'chenko 1960

Selected Synonymy & References

†**Zaphlegidae** Jordan *in* Jordan and Gilbert 1920.
†**Zaphlegidae** Jordan: David 1943:97.
†**Euzaphlegidae** Danil'chenko 1960.
†**Euzaphlegidae** Bannikov 2008.

Remarks: According to Danil'chenko (1960:142), the Family Zaphlegidae was established by Jordan on the type genus †*Zaphleges*, however White and Moy-Thomas (1941:400) renamed the genus †*Euzaphleges* based on homonymy.

Genus †*Euzaphleges* White and Moy-Thomas 1941

†*Euzaphleges longurio* (Jordan *in* Jordan and Gilbert 1920)

Figure 91

Selected Synonymy & References

†*Zaphleges longurio* Jordan *in* Jordan and Gilbert 1920:23-24, pl. 13.
†*Zaphleges longurio* Jordan: Jordan 1921a:271, pl. 38a (restoration).
†*Zaphleges longurio* Jordan: Jordan 1925:22, pl. 11a.
†*Zaphleges longurio* Jordan: Jordan 1927a:6.
†*Zaphleges longurio* Jordan: David 1943:150.
†*Thyrsocles kriegeri* (Jordan and Gilbert 1919a)[in part]:David 1943:98, 102, 150.
†*Zaphleges* cf. *longurio* Jordan: David 1944:41, pl. 5, fig. 44.
†*Thyrsion velox* Jordan *in* Jordan and Gilbert 1920: Jordan 1925:21 and David 1943:102.

Type Specimen: †*Zaphleges longurio* Jordan *in* Jordan and Gilbert 1920, holotype, CAS 55497 (SU 100, 23) right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan *in* Jordan and Gilbert (1920): None. †**Zaphlegidae**.

Referred Specimens of †*Z. longurio* in Jordan (1921a): Presumably from Lompoc: three specimens, all whereabouts unknown, SU 55, possibly 127 (Jordan's ambiguity), and 298. **Scombridae**.

Referred Specimens of †*Z. longurio* in Jordan (1925): From Lompoc: CAS 55540 (699), partial right counterpart, and two specimens with whereabouts unknown, SU 621 (76) and 630. **Cybiidae**.

Referred Specimens of †*Z. longurio* in Jordan (1927a): From Lompoc: SU 459, whereabouts unknown. **Cybiidae**.

Referred Specimens and Holotypes of †*T. velox* and †*Z. longurio* in David (1943): All from Lompoc: Holotype of †*Z. longurio*, CAS 55497 (SU 100, 23); holotype of †*T. velox*, CAS 55417 (SU 153, 28), partial left counterpart; referred specimens of †*Z. longurio*, CAS 55473 (77), partial right counterpart; 55495 (81 and

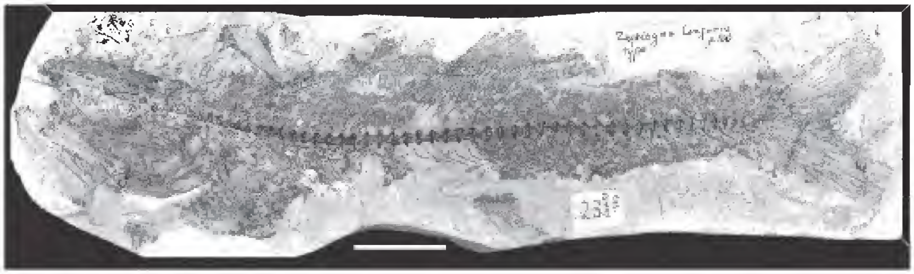


FIGURE 91. †*Euzaphleges longurio* (Jordan *in* Jordan and Gilbert 1920), holotype, CAS 55497 (from color image provided by CAS); scale bar equals 5 cm.

81a), partial left and right counterparts; 55511 (SU 318, 27), partial left counterpart; 55594 (SU 479, 79), counterpart; 55427 (SU 460, 80), partial left counterpart; six specimens with whereabouts unknown, SU 24, 475 (25), 738 (26), 153 (28), 621 (76), and 78. **Zaphlegidae**.

Referred Specimens of †***Z.* cf. *longurio*** in David(1944): From Western Gulf Oil Company Symons well no. 12-17, Buena Vista District, San Joaquin Valley, Middle-Late Miocene, Kern County; scale, whereabouts unknown.

Remarks: Specimens CAS 55511 and 55417, holotype, previously identified as †***T. velox***, are now assigned to †***T. kriegeri*** (see below).

Genus †***Thyrsocles*** Jordan and Gilbert 1920
†***Thyrsocles kriegeri*** (Jordan and Gilbert 1919a)

Figure 92

Selected Synonymy & References

†***Thyrsites kriegeri*** Jordan and Gilbert 1919a:41, pl. 17.

†***Thyrsocles kriegeri*** (Jordan and Gilbert): Jordan and Gilbert 1920:19-20; pls 11, 12.

†***Thyrsocles escharion*** Jordan *in* Jordan and Gilbert 1920:21: Jordan and Gilbert 1920:supplementary note and Jordan 1921a:274, p. 6a.

†***Thyrsocles kriegeri*** (Jordan and Gilbert): Jordan 1921a:273, 274, pl. 36a.

†***Thyrsocles velox*** Jordan 1921b:461-462, two unnumbered figures.

†***Thyrsocles kriegeri*** (Jordan and Gilbert): Jordan 1925:19-21.

†***Thyrsion velox*** Jordan *in* Jordan and Gilbert 1920:17: Jordan 1925:21.

†***Thyrsocles kriegeri*** (Jordan and Gilbert): Jordan 1927a:6.

†***Escharion townleyi*** Jordan 1925: David 1943:98.

†***Thyrsocles kriegeri*** (Jordan and Gilbert); David 1943:33, 98, 150, pl. 13, fig. 1; text-fig. 17a, c.

†***Thyrsocles kriegeri*** (Jordan and Gilbert): Huddleston and Takeuchi 2006:33, table 1.

Type Specimen: †***Thyrsites kriegeri*** Jordan and Gilbert 1919a, holotype, CAS 55483 (SU 474, 33), partial right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan and Gilbert (1919a): None.

Referred Specimens of †***T. kriegeri*** in Jordan and Gilbert (1920:20): From Lompoc: CAS 55530 (SU 303, 30), partial left counterpart; CAS 55416 (SU 306, 2), left counterpart; four specimens with whereabouts unknown, SU 29 (see Remarks), 51, 316, and 327. **Scombridae**.

Holotype and Referred Specimens of †***T. escharion*** reidentified as †***T. velox*** in Jordan and Gilbert (1920:21-22, supplementary note): CAS 55511 (SU 318, 27), partial left counterpart; nine specimens with whereabouts unknown, SU 280 (holotype), 12, 12B, 15, 20, 23, 69A and 69B and 505. **Scombridae**.

Referred Specimens of †***T. kriegeri*** in Jordan (1921a): No specific specimens mentioned. **Scombridae**.

Referred Specimens of †***T. kriegeri*** in Jordan (1925:19): From unspecified locality: three specimens, whereabouts unknown, SU 646, 698, and 752. **Cybiidae**.

Referrred Specimens and Holotype of †***Thyrsion velox*** Jordan reidentified as †***T. kriegeri*** by Jordan (1925:21): From Lompoc: CAS 55417 (SU 153, 28), holotype, counterpart; 55596 (SU 620, 129), partial left counterpart. **Cybiidae**.

Holotype of †***E. townleyi*** in Jordan (1925:24): CAS 55416 (SU 306, 2), left counterpart; no referred specimens. **Cybiidae**.

Referred Specimens of †***T. kriegeri*** in Jordan (1927a:6): From unspecified locality: CAS 55483 (SU 474, 33), partial right counterpart; 55594 (SU 479, 79), counterpart; SU 475, whereabouts unknown. **Cybiidae**.

Referred Specimens of †***T. kriegeri*** in David (1943:33, 98, 150): From Lompoc: CAS 55530 (SU 303, 30), left counterpart, 55640 (SU 245, 84), counterpart; 55505 (SU 85), right counterpart; 55509 (SU 86), partial right counterpart; 55654 (SU 87), partial right counterpart; 55502 (SU 89), counterpart; 55427 (SU 460), partial left counterpart; 55622 (SU 751, 33), partial right counterpart; 12 specimens with whereabouts unknown, SU 29, 31 (752), 32 (702), 82, 83 (459), 88, 90, 469 and four uncatalogued specimens belonging to Johns-Manville Corp.

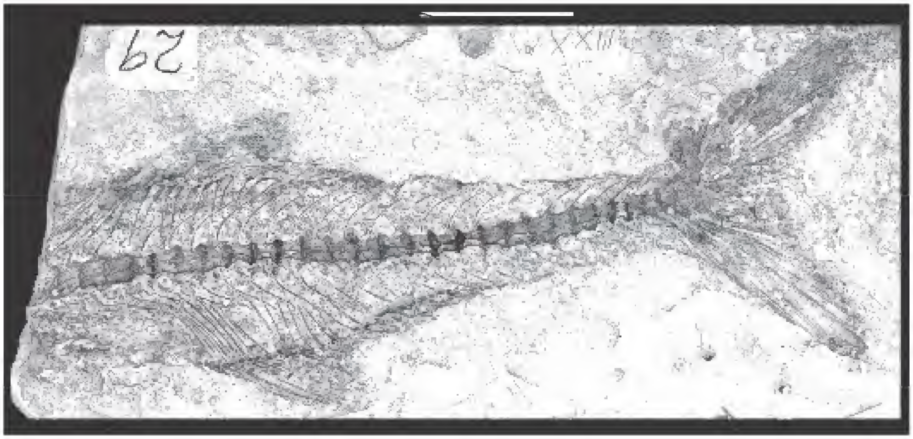


FIGURE 92. †*Thyrsocles kriegeri* (Jordan and Gilbert 1919a), holotype, CAS 55483 (from color image provided by CAS); scale bar equals 5 cm.

From Lompoc LACM (CIT) locality 365, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; LACM (CIT) 10199, partial left counterpart; 10217, left counterpart.

From LACM (CIT) locality 424, Modelo Formation, Late Miocene, Mulholland Drive, Los Angeles County, California; two unctalogued specimens, possibly partial left counterpart LACM (CIT) 10295, otherwise whereabouts unknown.

From LACM (CIT) locality 317, Modelo Formation, Late Miocene, Sepulveda Canyon: uncatalogued UCLA specimen, whereabouts unknown.

From Mulholland Drive: one uncatalogued specimen (#21 in Layton Collection), whereabouts unknown. David 1943:151 mentions in her description of †*Trossulus exoletus* Jordan (see below) that the uncatalogued specimen is a young †*T. kriegeri*. **Zaphlegidae.**

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Remarks: The slab containing the holotype of †*T. kriegeri* has several numbers written on it, CAS 55483, SU 474, 33, and 29. Jordan and Gilbert (1920:21) list SU 29 as a different specimen from the holotype (CAS 55483). This is very confusing. Jordan and Gilbert (1920) in their supplementary note state that †*T. escharion* and †*T. velox* are identical and that †*T. velox* has page priority if distinct from †*T. kriegeri*. As noted above, they are not distinct. No specimen numbers of †*T. escharion* and †*E. townleyi* listed in Jordan (1920, 1925) were mentioned in David (1943:98). †*Thyroscles escharion* was listed in the synonymy as in part, but no qualification was given for †*E. townleyi*.

Genus †*Zaphlegulus* David 1943

Selected Synonymy & References

†*Zaphlegulus* David 1943:104.
†*Zaphlegulus* David: Bannikov 2008:100.

†*Zaphlegulus venturaensis* David 1943:104, pl. 13 fig. 2, text-fig. 18

Figure 93

Type Specimen: †*Zaphlegulus venturaensis* David 1943, holotype, LACM (CIT) 10200, right counterpart.

Type Locality: LACM (CIT) locality 385, near Simi, Modelo Formation, Late Miocene, Ventura County.

Paratype: From type locality: USC, uncatalogued, whereabouts unknown.

Referred Specimen: From LACM locality 1048, Sulfur Mountain: LACM 1293, counterpart.

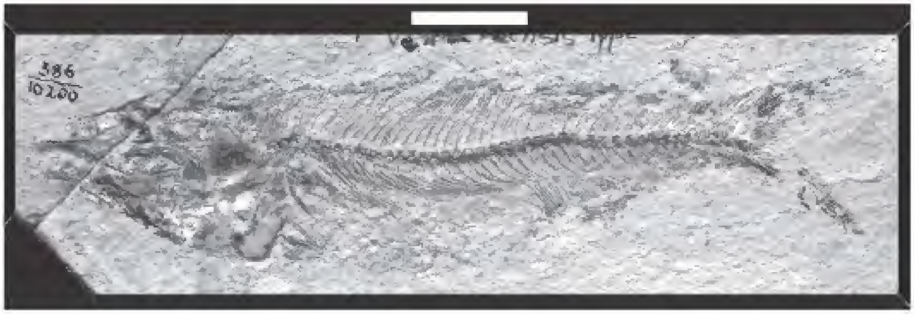


FIGURE 93. †*Zaphlegulus venturaensis* David 1943, holotype, LACM (CIT) 10200 (from color photo provided by LACM); scale bar equals 2 cm.

Family **Euzaphlegidae** *incertae sedis*

Genus ***Trossulus*** Jordan 1921a
†?***Trossulus exoletus*** Jordan 1921a

Figure 94

Selected Synonymy & References

†*Trossulus exoletus* Jordan 1921a:250, pls. 8c, 28a (restoration).
†?*Trossulus exoletus* Jordan: David 1943:150.

Type Specimen: †***Trossulus exoletus*** Jordan 1921a, holotype, CAS 70042 (SU 548, 193), two separate specimens on same slab, one a right counterpart and the other a left counterpart. **Paralepidae.**

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in David (1943:150): Holotype and an uncatalogued specimen in the SU collection, whereabouts unknown. Zaphlegidae.

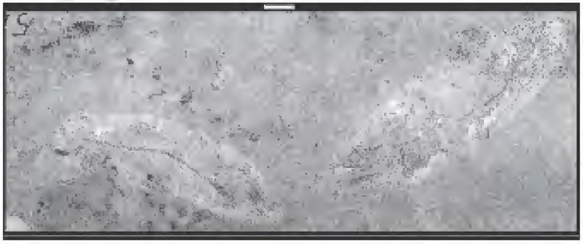


FIGURE 94. †?*Trossulus exoletus* Jordan 1921a, holotype, CAS 70042 (from color image provided by CAS); scale bar equals 1 cm.

Family **Sphyraenidae**

Genus ***Sphyraena*** Bloch and Schneider 1801
Sphyraena argentea Girard 1854c

Type Specimen: Extant, ***Sphyraena argentea*** Girard, whereabouts unknown (Eschmeyer 1998:131).

Type Locality: San Diego, California.

Referred Specimens in Fitch and Lavenberg (1971:142): No specific specimens mentioned. The authors state that otoliths of ***S. argentea*** have been found in several Pliocene deposits in southern California (see Remarks).

Remarks: Because Fitch and Lavenberg (1971) did not give any specific fossil locality containing otoliths of ***S. argentea***, its presence in the Neogene of California is questionable.

Family **Scombridae** *sensu* Orrell et al. 2006

Genus ***Scomber*** Linnaeus 1758

Remarks: Bannikov and Sorbini (1984:309) placed the type species of †***Auxides*** Jordan 1919:10, †***Thynnus propterygius*** Agassiz 1833-43, in the genus †***Scombrosarda*** Danil'chenko 1962, however Monsch (2006:874) argued †***Auxides*** is a valid genus for specimens from the Paleocene sediments of the Tethys region, but agreed with Bannikov (1985:24) that †***Auxides*** should not include the mackerel-like fishes from the Miocene of North America. Bannikov (1985:24) listed the following fossil genera in the synonymy of ***Scomber*** Linnaeus: †***Turio*** Jordan and Gilbert (1920), †***Thyrsion*** Jordan ***in*** Jordan and Gilbert (1920), †***Auxides*** Jordan (1921a), and †***Irifera*** Jordan (1927a).

†***Scomber sanctaemonicae*** (Jordan 1919)

Figure 95

Selected Synonomy & References

†Scombroid fish Jordan 1907:133: Jordan 1919:10.
†Pterothrissoid fish Jordan 1907:127, fig. 22: Jordan 1919:10.
†***Auxides sanctae-monicae*** **Jordan 1919:10-12, pl. 5, fig. 2.**
†***Auxides sanctae-monicae*** **Jordan: Jordan 1921a:268.**
†***Scomber sanctae-monicae*** **(Jordan): David 1943:29, text fig. 7.**

Type Specimen: †***Auxides sanctae-monicae*** Jordan 1919, holotype, CAS 55613 (SU 51, 154), partial right counterpart.

Type Locality: Brown's Cañon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Referred Specimens in Jordan 1919: From the type locality: two partial counterparts, one (SU 41) originally identified as a scombroid fish and the other, CAS 55415, as a pterothrissoid fish. SU 41 is one of the numbers associated with the holotype of †***Syngnathus avus*** and most likely the correct number for the referred specimen is CAS 55611 (SU 52).

Referred Specimens in David (1943): From LACM (CIT) locality 321, Santa Monica Mountains, Modelo

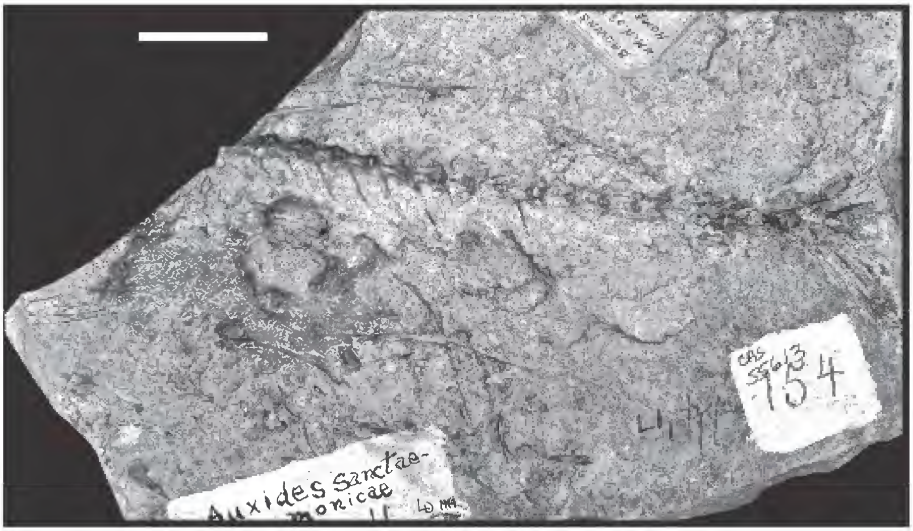


FIGURE 95. †*Scomber sanctaemonicae* (Jordan 1919), holotype, CAS 55613 (from color image provided by CAS); scale bar equals 3 cm.

Formation, Late Miocene, Los Angeles County; five specimens: left counterpart LACM (CIT) 10051.

From LACM (CIT) locality 317, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; number 19 in Layton collection, whereabouts unknown.

From LACM (CIT) locality 321, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; partial right counterpart LACM (CIT) 10052.

From LACM (CIT) locality 320: Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; two head fragments, whereabouts unknown and LACM (CIT) 10147, well-preserved head of right counterpart.

Distribution of Neogene †***S. sanctaemonicae*** outside of California: None known.

Remarks: The hyphen was removed from the species name to comply with Article 27 of the International Code of Zoological Nomenclature [Eschmeyer (1990:253)]. See Remarks Section for ***Scomber japonicus***.

Scomber japonicus Houttuyn 1782

Selected Synonymy & References

Scomber japonicus Houttuyn 1782: Fitch 1969a:72, table 1.
Scomber japonicus Houttuyn: Fitch and Lavenberg 1971:130.

Type Specimen: Extant, ***Scomber japonicus*** Houttuyn, type specimen unknown (Eschmeyer 1995:807).

Type Locality: Off Japan.

Referred Specimens in Fitch (1967a:72, table1): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 15 otoliths.

From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; three otoliths.

From LACMIP locality 31425, Downtown Los Angeles, Pico Formation, Plio-Pleistocene, Los Angeles County; four otoliths.

Referred Specimens in Fitch and Lavenberg (1971:130): No specific specimens, but otoliths of ***S. japonicus*** are present, although not abundant, in several Pliocene deposits in southern California, and skeletal imprints and otoliths of ***Scomber*** (possibly ***S. japonicus***) have been found in several Miocene outcrops.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***S. japonicus*** from this locality is questionable.

Scomber* cf. *S. japonicus Houttuyn 1782

Selected Synonymy & References

†***Turio wilburi*** Jordan and Gilbert 1920:15, pls. 6, 7.
†***Turio wilburi*** Jordan and Gilbert: Jordan 1921a:273, pl. 37.
†***Turio wilburi*** Jordan and Gilbert: Jordan 1925:23.
†***Turio culveri*** Jordan 1925:23, not pl. 10b [in part]: David 1943:151.
†***Thyrsion velox*** Jordan *in* Jordan and Gilbert 1920:17, pls. 8, 9 [in part]: David 1943:151.
†***Irifera ringens*** Jordan1927a: David 1943:151.
†***Coronadus stocktoni*** Jordan 1927a:8, pl. 1c: David 1943:151.
†***Auxides dasson*** Jordan 1921a:269, pls. 3, 36a:David 1943:151-153.
†***Auxides bruntoni*** Jordan 1921a:270, pl. 9a: David 1943:151-153.
Pneumatophorus* cf. *grex (Mitchell 1814:11): David 1943:151-153.
Pneumatophorus* cf. *grex (Mitchell): David 1944:39, pl. 4, fig. 34.
Pneumatophorus* cf. *P. grex (Mitchell): Pierce 1956:1311, pl. 144, fig. 12.
Scomber japonicus Houttuyn 1782: Matsui 1967:71, 81.
Scomber japonicus Houttuyn: Collette and Nauen 1983:56.
†***Turio wilburi*** Jordan and Gilbert: Frickhinger 1995:909, unnumbered fig.

Referred Specimens and Holotype of †***T. wilburi*** Jordan and Gilbert (1920): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55425 (SU 49A, 163), left (right?) counterpart, holotype; CAS 55410 (SU 178 and 179, right and left counterparts; CAS 55642 (SU 180, 201), complete right counterpart; three specimens with whereabouts unknown, SU 6, 7, and 21.

Referred Specimens of †***T. wilburi*** in Jordan (1921a): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 8, whereabouts unknown.

Referred Specimens of †***T. wilburi*** in Jordan (1925): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 679 and 701, both with whereabouts unknown.

Holotype of †***A. dasson*** Jordan (1921a) reidentified as ***P.* cf. *grex*** by David (1943:153): From El Modena, Monterey Formation, Late Miocene, Orange County; CAS 55428 (SU 66, head and 67, tail), partial left counterpart. No referred specimens known.

Holotype of †***A. bruntoni*** Jordan (1921a) reidentified as ***P.* cf. *grex*** by David (1943:153): From El Modena, Monterey Formation, Late Miocene, Orange County; CAS 55409 (SU 70, 157 figure legend in Jordan reads SU 68), partial left counterpart. No referred specimens known.

Referred Specimens of †***T. velox*** Jordan *in* Jordan and Gilbert (1920) reidentified as ***P.* cf. *grex*** by David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55416 (SU 127, 2), complete left counterpart; 55596 (SU 620, 129), partial left counterpart.

Referred Specimens and Holotype of †***Irifera ringens*** Jordan 1927a reidentified as ***P.* cf. *grex*** by David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 477 (185), left counterpart (see Remarks).

Referred Specimens and Holotype of †***T. wilburi*** reidentified as ***P.* cf. *grex*** by David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55425 (SU 49A, 163), left (?right) counterpart, holotype; CAS 55642 (SU 180, 201), complete right counterpart.

Referred Specimens of †***T. culveri*** Jordan 1925 reidentified as ***P.* cf. *grex*** by David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55485 (SU 695, 182), partial left counterpart.

Referred Specimens and Holotype of †***C. stocktoni*** Jordan reidentified as ***P.* cf. *grex*** by David (1943): From Lompoc: SU 473, holotype, right counterpart (see Remarks); SU 183 (456), whereabouts unknown.

Additional Referred Specimens identified as ***P.* cf. *grex*** by David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; partial right counterpart CAS 55639 (SU 474, 126), partial counterpart 55481 (128); 55480 (SU 184, 18), partial left counterpart.

From unspecified locality: UCLA 8668, whereabouts unknown.

From unspecified locality: USC 202, whereabouts unknown.

From locality LACM (CIT) locality 365, Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; LACM (CIT) 10211, right counterpart.

Referred Specimens of ***P.* cf. *grex*** in David (1944:pl. 4, fig.34): From Continental Oil Company "Turnbull" well number 3, Puente Hills, lower Puente Formation, Middle–Late Miocene, Los Angeles County; scale, whereabouts unknown.

Referred Specimens of ***P.* cf. *P. grex*** (Mitchell) in Pierce (1956:1311, pl. 144, fig. 12): From Benedict Canyon, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; USC 3643, scale (pl. 144, fig. 12), whereabouts unknown.

Referred Specimens of †***T. wilburi*** figured in Frickhinger (1995): He figured a specimen (no museum number) and gave a general description of the species, based apparently on the early literature. The specimen is housed in the USNM collection and he gave the general locality as Miocene of California.

Remarks: David (1943:153) included †***A. dasson*** and †***A. bruntoni*** in the synonymy because the holotypes were too fragmentary to recognize as a separate genus and species. David (1943:29) also included a third species, †***A. sanctae-monicae***, that we recognize as †***Scomber sanctaemonicae*** based on her earlier article. ***Pneumatophorus grex*** was placed in the synonymy of ***Scomber japonicus*** by Matsui (1967) and Collette and Nauen (1983), therefore we included ***P.* cf. *grex*** (or more correctly, ***P.* cf. *P. grex***) in the synonymy as well. Specimen SU 477 (185) is in the CAS collection designated as the holotype of †***I. ringens***, but is not listed in the CAS database because it has not been given a catalogue number. Similarly SU 473 is in the CAS collection designated as the holotype †***C. stocktoni***, but is not listed in the CAS database.

Scomber sp.

Selected Synonymy & References

***Scomber* sp.**: David 1943:74
***Scomber* sp.**: Huddleston and Takeuchi 2006:33, table 1

Referred Material in David (1943:74): The following specimens are from the Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

From LACM (CIT) locality 326: LACM (CIT) 10017, posterior fragment of head; four specimens, numbers 87, 89, 90, and 95 from R. W. Fraser collection, whereabouts unknown.

F rom LACM (CIT) locality 381: several uncatalogued fragments, whereabouts unknown.

From LACM (CIT) locality 326B: uncatalogued fragment, whereabouts unknown.

From LACM (CIT) locality 329: four uncatalogued specimens, whereabouts unknown.

From LACM (CIT) locality 382: numerous uncatalogued fragments in the Los Angeles City College Collection, whereabouts unknown.

From locality Mullholland Drive, Modelo Formation, Late Miocene, Los Angeles County; UCLA 265, a fragment, whereabouts unknown.

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Genus *Sarda* Cuvier 1829

†*Sarda stockii* David 1943

Figure 96

Selected Synonymy & References

†***Sarda stockii*** David 1943:31, pl. 4.
†***Sarda stockii*** David: David 1943:155.
†***Sarda* cf. *stockii*** David: David1944:39-40, pl. 4, figs. 35, 36, pl. 5, 43, 47.
Sarda chiliensis lineolata (Girard 1859): Collette and Chao 1975:601.
†***Sarda stockii*** David: Bannikov 1979:98.
Sarda chiliensis (Cuvier in Cuvier and Valenciennes1832): Collette and Nauen 1983:51.
†***Sarda stockii*** David: Bannikov 1985:51, text-fig. 36.

Type Specimen: †***Sarda stockii*** David 1943, holotype, LACM 1059, right and left counterparts.

Type Locality: LACM locality 1035 (= CIT locality 334), Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County.

Paratype (= cotype of David [1943]): From type locality: LACM (CIT) 10039, right and left counterparts.

Referred Specimens in David (1943:155): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara, County; partial counterpart, SU 124 (479), whereabouts unknown.

Referrred Specimens in David (1944): From Union Oil Company "Chapman" well no. 29, Lower Puente Formation, Middle-Late Miocene, Los Angeles County; two scales (pl. 4, figs. 35, 36), whereabouts unknown.

From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; two scales (pl. 5, figs. 43, 47), whereabouts unknown. **Thunnidae**.

Referred Specimens in Collette and Nauen (1983): No specimens were identified, just a listing in the synonymy of ***S. chiliensis***.

Referred Specimens in Bannikov (1985): No specific specimen was identified. He only referred to David (1943) and Collette and Chao (1975).

Remarks: Collette and Chao (1975:602) mixed the museum numbers of the holotype and paratype with the locality numbers, e.g., the specimen LACM 1035/1059A (holotype) should have been CIT 10039 from CIT locality 1035.

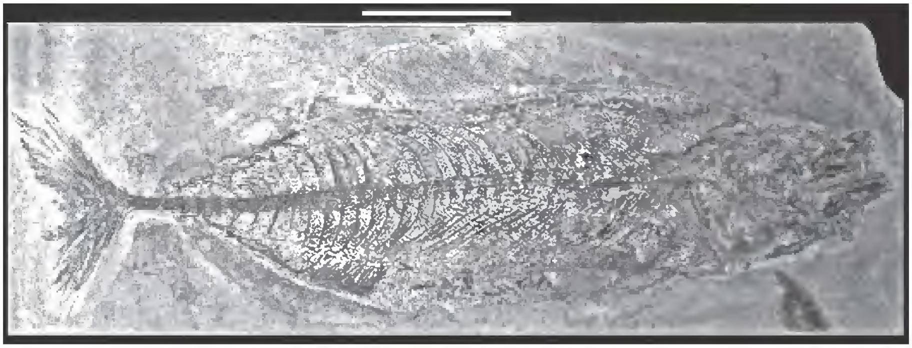


FIGURE 96. †*Sarda stockii* David 1943, holotype, LACM 1059 (from color photo provided by LACM); scale bar equals 10 cm.

†*Sarda* cf. *S. stockii* David 1943

Selected References

†*Sarda* cf. *stockii* David1944:39-40, pl. 4, figs. 35, 36, pl. 5, 43, 47.
†*Sarda* cf. *S. stockii* David 1943:Pierce 1956: 1311, pl. 144, fig. 10.

Referred Specimens in David (1944): From Union Oil Company "Chapman" well no. 29, Lower Puente Formation, Middle-Late Miocene, Los Angeles County; two scales (pl. 4, figs. 35, 36), whereabouts unknown.

From Girard-Mineral Springs, Santa Monica Mountains, Modelo Formation, Late Miocene, Los Angeles County; two scales (pl. 5, figs. 43, 47), whereabouts unknown. **Thunnidae.**

Referred Specimens in Pierce (1956): From Benedict Canyon, Santa Monica Mountains, Modelo formation, Late Miocene, Los Angeles County; USC 3644, scale (pl. 144, fig. 10), whereabouts unknown. **Thunnidae.**

Remarks: We prefer to use the name †*S.* cf. *S. stockii* rather than †*S.* cf. *stockii.*

Sarda sp.

Referred Specimens in Huddleston and Takeuchi (2006:33, table 1): From LACM locality 6907, Pomona Freeway Chalk Hill, Puente Formation, Late Miocene, Los Angeles County; no specific specimens mentioned.

Genus †***Ocystias*** Jordan *in* Jordan and Gilbert 1920

†***Ocystias sagitta*** Jordan *in* Jordan and Gilbert 1920

Selected Synonymy & References

†***Ocystias sagitta*** Jordan *in* Jordan and Gilbert 1920:18. pl. 10.
†***Ocystias sagitta*** Jordan: Jordan 1921a:273. pl. 38b.
†***Ocystias sagitta*** Jordan: Jordan 1925:22.
†***Ocystias sagitta*** Jordan: David1943:153, text-fig. 32.

Type Specimen: †***Ocystias sagitta*** Jordan *in* Jordan and Gilbert 1920, holotype SU 20 (180), left counterpart, whereabouts unknown.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan (1925): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 760 (125), whereabouts unknown.

Referred Specimens in David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; holotype and SU 760 (125), whereabouts unknown.

Genus †***Xestias*** Jordan 1921a

†***Xestias iratus*** Jordan 1921a

Figure 97

Selected Synonymy & References

†***Xestias iratus*** Jordan 1921a:270, pl. 4a.
†***Xestias iratus*** Jordan: Jordan 1925:23.

Type Specimen: †***Xestias iratus*** Jordan 1921a, holotype, CAS 55498 (SU 222, 121), head, left counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in Jordan (1925): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55443 (SU 694, 6), right counterpart.

Remarks: see Remarks section for †***Thunnus starksi***.

Genus †***Tunita*** Jordan and Gilbert 1919a

†***Tunita octavia*** Jordan and Gilbert 1919a

Figure 98

Selected Synonymy & References

†***Tunita octavia*** Jordan and Gilbert 1919a:42, pl. 12, fig. 2.
†***Tunita octavia*** Jordan and Gilbert: Jordan 1921a:271, pl. 39 (restoration).

Type Specimen: †***Tunita octavia*** Jordan and Gilbert 1919a, holotype, CAS 55434 (SU 7, 95), partial right counterpart.

Type Locality: El Modena, Monterey Formation, Late Miocene, Orange County.

Referred Specimens: From El Modena, Monterey Formation, Late Miocene, Orange County; three specimens with whereabouts unknown, SU 121 (anterior counterpart), 12 (torso), and 10 (two caudal fins).

From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; SU 8 (posterior counterpart), whereabouts unknown.

Referred Specimens in Jordan (1921a): None. Only alluded to the type specimen.

Remarks: The LACM catalog lists LACM 1331 as the paratype from LACM locality 1033. Jordan (1921:271) reidentified SU 8 as †***T. wilburi*** (= ***Scomber japonicus***).

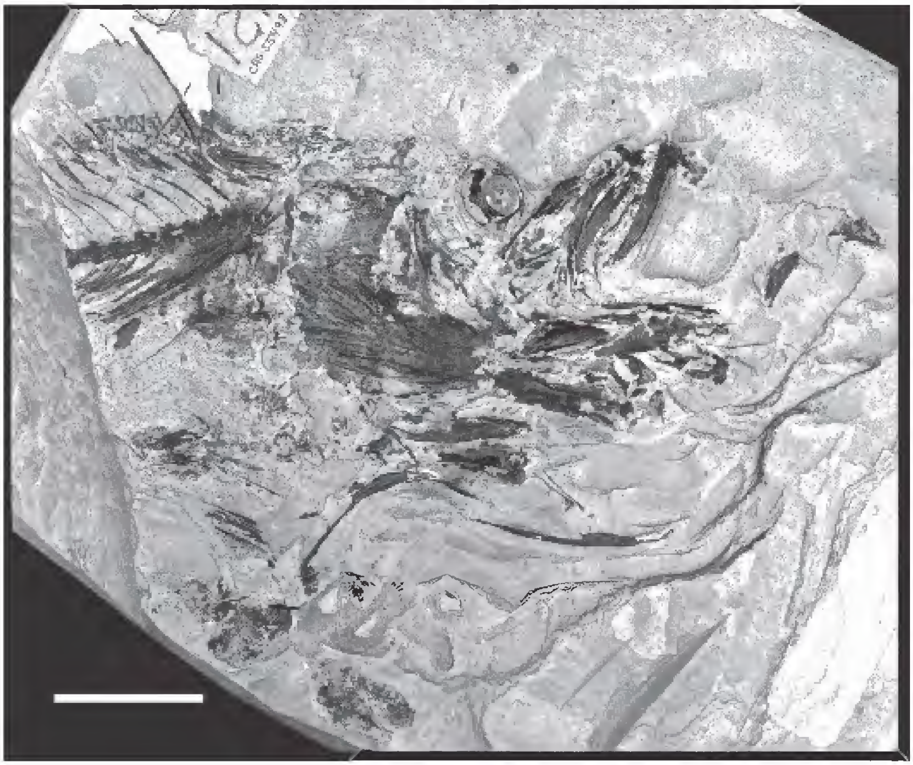


FIGURE 97. †*Xestias iratus* Jordan 1921a, holotype, CAS 55498 (from color image provided by CAS); scale bar equals 5 cm.

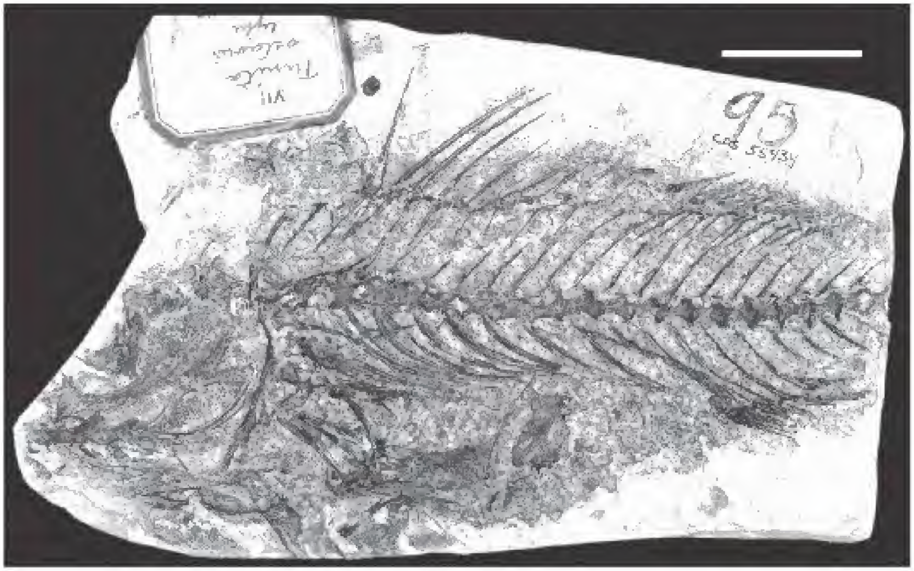


FIGURE 98. †*Tunita octavia* Jordan and Gilbert 1919a, holotype, CAS 55434 (from color image provided by CAS); scale bar equals 3 cm.

†*Tunita* sp.

Selected Synonymy & References

†*Tunita* species undescribed: Jordan 1921a:271.
†*Tunita* species indeterminate: Jordan 1925:45.

Referred Specimens in Jordan (1921a): From Covina; SU 68A and 68B, right and left counterparts, whereabouts unknown.
Referred Specimen in Jordan (1925): From Covina; no specimen number, whereabouts unknown.

Genus *Thunnus* South 1845
†*Thunnus starksi* (Jordan 1925)
Figure 99

Selected Synonymy & References

†***Aliciola starksi*** Jordan 1925:27, pl. 14.
†?***Xestias iratus*** Jordan 1921a:270, pl .4.
†***Thunnus starksi*** (Jordan):David 1943:155, pl. 33.
†***Thunnus starksi*** (Jordan):Bannikov 1985:61.

Type Specimen: †***Aliciola starksi*** Jordan 1925, holotype, CAS 70113 (SU 120, 644), right counterpart and 70087 (SU 120a, 644a), left counterpart.

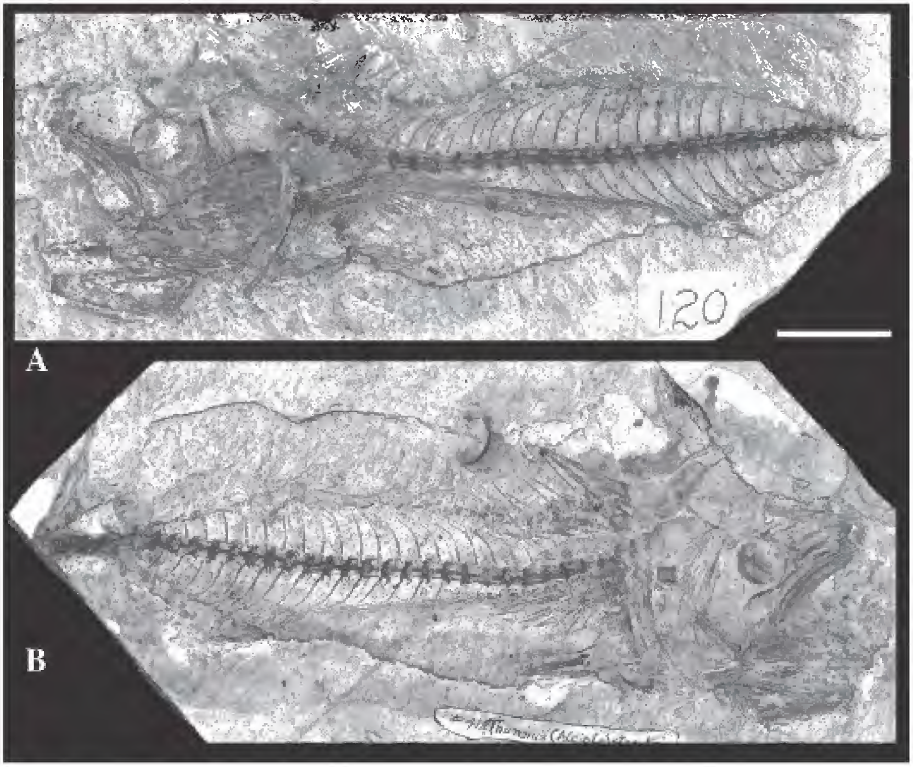


FIGURE 99. †*Thunnus starksi* (Jordan 1925), holotype, CAS 70113 (A) and 70087 (B) (from color image provided by CAS); scale bar equals 5 cm.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens: From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 70063 (SU 122, 632) and 70088 (SU 123), right and left counterparts.

Holotype of ***Xestias iratus*** Jordan 1921a reidentified by David (1943:155): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55498 (SU 222, 121) head fragment.

Referred Specimens in Bannikov (1985): None.

Remarks: David (1943) incorrectly spelled ***Aliciola*** as *Alciola* throughout her publication. Because David did not list reasons for including †***X. iratus*** in the synonymy of †***T. starksi***, thus we continue to recognize it as a genus and species within the Scombridae (see above).

Thunnus sp.

Selected Synonymy & References

†***Aliciola*** (misspelled as *Alciola*) Jordan 1925: David 1943:86.
***Thunnus* sp.**: David 1943:155.
***Thunnus* sp.**: David 1944:32, pl. 3, fig. 21.
***Thunnus* sp.**: Boessenecker 2011:17-18, figs. 7.1-7.2.

Referred Specimens in David (1943): From LACM (CIT) locality 341, Palos Verdes, Altamira Shale Member, Monterey Formation, Middle Miocene, Los Angeles County; LACM (CIT) 10102, right counterpart, and five large fragments.

Referred Specimens in David (1944: pl. 3, fig. 21): From Texas Company Pioneer Unit Plan well number 1, Early-Middle Miocene, Sunset district, San Joaquin Valley, Kern County; uncatalogued scale, whereabouts unknown.

Referred Specimens in Boessenecker (2011): From UCMP locality V99849, south of Halfmoon Bay, Purisima Formation, Late Pliocene, San Mateo County; UCMP 219066, vertebra.

Genus †***Ozymandias*** Jordan 1919

†***Ozymandias gilberti*** Jordan 1919

Figure 100

Selected Synonymy & References

***Luvarus* sp.**: Jordan 1907:134-135, pl. 11.
†***Ozymandias gilberti*** Jordan 1919:43-44, pl. 21.
†***Ozymandias gilberti*** Jordan: Jordan 1920:36-37, pl. 24.
†***Ozymandias gilberti*** Jordan: Jordan 1921a:275, pl. 13.

Type Specimen: †***Ozymandias gilberti*** Jordan 1919, holotype, CAS 55507 (SU 132), counterpart with vertebral segment. **Luvaridae?**

Type Locality: San Pedro, Los Angeles County.

Referred Specimens: None.

Referred Specimens in Jordan (1907:134-135, pl. 11): From type locality: No museum number given, but the vertebral segment illustrated in plate 11 is the same specimen as the holotype (CAS 55507) illustrated in Jordan (1919: pl. 21). **Luvaridae**.

Referred Specimens in Jordan (1920): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55583 (SU 332), counterpart with vertebral segment. **Ophiodontidae**.

Referred Specimens in Jordan (1921a:275, pl. 13): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 55597 (SU 549), counterpart with head only. Jordan stated in the legend of pl. 13 that the specimen seemed to "fit" the vertebral column of the holotype (CAS 55507). **Scombridae**.

Remarks: Jordan (1921a:290) reidentified CAS 55583 and assigned it to the genus ***Ophiodon*** as a new species, †***O. ozymandias*** Jordan (see listing under ***Ophiodon***). The legend of pl. 24 in Jordan (1920) lists the specimen number as SU 13, not SU 332. We assume this is an error.

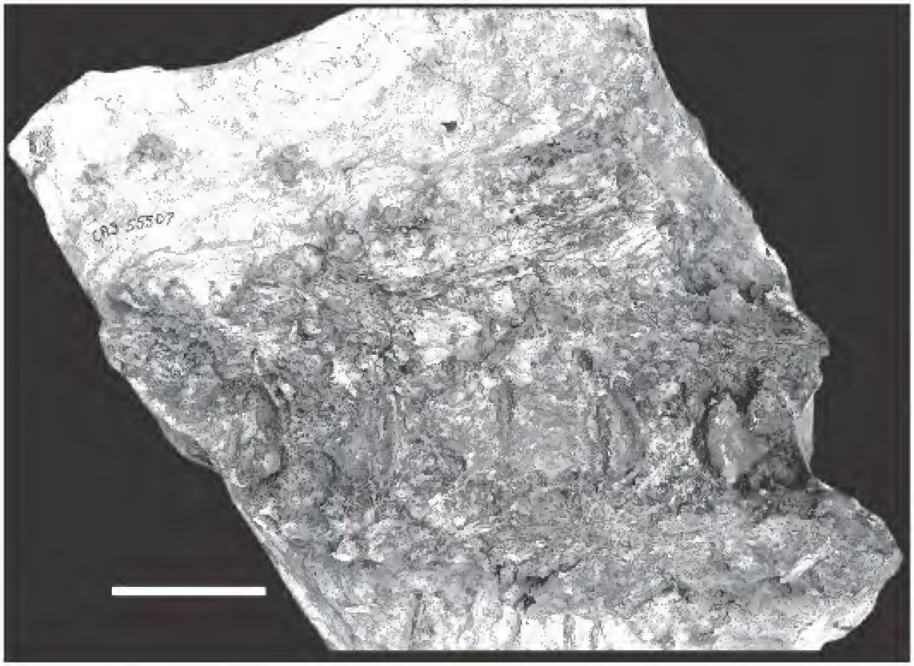


FIGURE 100. †*Ozymandias gilberti* Jordan 1919, holotype, CAS 55507 (from color image provided by CAS); scale bar equals 5 cm.

Suborder **Xiphioidei**

Family **Istiophoridae** *sensu* Robins & de Sylva 1960

Genus ***Istiophorus*** Lacepède 1801

Istiophorus platypterus (Shaw & Nodder 1792)

Selected References

Istiophorus platypterus (Shaw & Nodder): Gottfried 1982:151.
Istiophorus platypterus (Shaw & Nodder): Fierstine 1990:15.
Istiophorus platypterus (Shaw & Nodder): Fierstine 2001:37.
Istiophorus platypterus (Shaw & Nodder): Fierstine 2006:444.

Type Specimen: Extant, ***Xiphias platypterus*** Shaw and Nodder, holotype, BMNH 1964.7.2.1, (Nakamura 1983:277).

Type Locality: Indian Ocean (Nakamura 1983:277).

Referred Specimens in Gottfried (1982) and Fierstine (1990, 2001, 2006): From UCMP locality V81058, San Diego Formation, Late Pliocene, San Diego County; precaudal (= trunk) vertebra, UCMP 125228.

Distribution of Neogene *I. platypterus* and *I. platypterus*-like specimens outside of California: From Yorktown Formation, Early Pliocene, North Carolina, U.S.A.: ***I. platypterus*** and ***Istiophorus* cf. *I. platypterus*** (Fierstine (2001).

From Eastover Formation, Late Miocene, Virginia, U.S.A.; ***Istiophorus* cf. *I. platypterus*** (= ***I. calvertensis*** Berry 1917), holotype (Fierstine 1998).

Distribution of Neogene *Istiophorus* sp. outside of California: ***Istiophorus*** sp.; Bahía Inglesa Formation, Mio-Pliocene, Chile (Walsh 1999).

Genus ***Makaira*** Lacepède 1802

Makaira nigricans Lacepède 1802

Selected Synonymy & References

***Makaira* sp.**: Fierstine and Applegate 1968:32.
***Makaira* sp.**: Fierstine 1974:37; fig. 9.
Istiophoridae: Barnes et al. 1981:58.
Makaira: Fierstine and Welton 1988:14, 17.
***Makaira* sp.**: Fierstine 1990:table 2.
***Makaira* sp.**: Schultz 1996:22.
Makaira nigricans Lacepède: Fierstine 1999:435, table 3.
Makaira nigricans Lacepède: Fierstine 2001:37, table 6.
Makaira nigricans Lacepède: Carnevale et al. 2002:table 3.
Makaira nigricans Lacepède: Fierstine 2008:45, 48.

Type Specimen: Extant, ***Makaira nigricans*** Lacepède, holotype sketch of a 365 kg adult sent to Lacepède in the MNHN (Nakamura, 1983:329).

Type Locality: Ile de Ré, Bay of Biscay, France (Nakamura 1983:329).

Referred Specimens in Fierstine and Applegate (1968) and Fierstine (1974): From LACM locality 1945, Monterey Formation, Late Miocene, Orange County; LACM 17693, rostral fragment.

Referred Specimens in Barnes et al. (1981) and Carnevale et al. (2002): From UCMP locality V68147 (= LACM locality 4297), San Mateo Formation, latest Miocene, San Diego County; UCMP 118559 (= LACM 119247), several skull bones and a vertebra.

Referred Specimens in Fierstine and Welton (1988), Fierstine (1990, 1999), Schultz (1996): both specimens above (LACM 17693 and UCMP 118559).

Referred Specimens in Fierstine (2008): From OCPC locality 3101, Oso Member, latest Miocene, Capistrano Formation, Orange County; both specimens above; OCPC 31001, a nearly complete skull.

Distribution of Neogene ***M. nigricans*** and ***M. nigricans***-like specimens outside of California: From Trinidad Formation, Late Miocene- Late Pliocene, Baja California Sur, Mexico: ***M. nigricans*** (Fierstine et al. 2001).

From Yorktown Formation, Early Pliocene, North Carolina, U.S.A.: ***M. nigricans*** and ***Makaira* sp. cf. *M. nigricans*** (Fierstine 2001).

From middle or Late Miocene, Anvers, Belgium: **?*M. nigricans*** (= ***Brachyrhynchus belgicus*** Leriche 1926, holotype) (Fierstine 2006).

From Eastover Formation, Late Miocene, Virginia, U.S.A.: ***Makaira* sp. cf. *M. nigricans*** (Fierstine 1998).

From Petra Leccese, Late Miocene, Italy: ***Makaira* sp. cf. *M. nigricans*** (Carnevale et al. 2002).

Distribution of Neogene ***Makaira* sp.** outside of California: Early Pliocene, near Andalusia, Spain (Schultz 1996).

Istiophoridae genus and species undetermined

Selected Synonymy & References

Istiophoridae genus and species undetermined:Fierstine and Applegate (1968:30).
***Makaira* sp.**: Fierstine and Applegate (1968:32).
***Makaira* sp.**: Fierstine (1974:37).
Istiophoridae genus and species undetermined: Fierstine (2001:37).
Istiophoridae genus and species undetermined: Atterholt et al. (2007).

Referred Specimens of **Istiophoridae** genus and species undetermined in Fierstine and Applegate (1968): From LACM locality 1625, Sharktooth Hill, Middle Miocene, Kern County; LACM 17695, precaudal vertebra.

Referred Specimens of ***Makaira* sp.** in Fierstine and Applegate (1968): From LACM locality 65119, Monterey Formation, Late Miocene, Orange County; LACM 16074, predentary.

Referred Specimens of ***Makaira* sp.** in Fierstine (1974): Same as entry above, from LACM locality 65119: LACM 16074, predentary.

Referred Specimens of **Istiophoridae** genus and species undetermined in Fierstine (2001): Same as entry above, from LACM locality 65119: LACM 16074, predentary.

Referred Specimens of **Istiophoridae** genus and species undetermined in Atterholt et al. (2007): From ABDSP locality V8005, Yuha Member, Deguynos Formation, mid-Pliocene, San Diego County; ABDSP 2813, precaudal vertebra.

Distribution of Neogene **Istiophoridae** genus and species undetermined outside of California: Yorktown Formation, Early Pliocene, North Carolina, U.S.A. (Fierstine 2001).

Order Pleuronectiformes

Family **Paralichthyidae**

Genus ***Paralichthys*** Girard 1858

†***Paralichthys antiquus*** (Jordan 1924)

Figure 101

Selected Synonymy & References

†***Hippoglossus antiquus*** Jordan 1924:43, pl. b.
†***Vorator antiquus*** (Jordan): Jordan 1925:17, pls. 8, 9.
†***Paralichthys* (*Vorator*) *antiquus*** (Jordan): David 1943:164.
†***Vorator* (= *Hippoglossoides*) *antiquus*** (Jordan 1925): Chanet and Schultz 1994: 102.

Type Specimen: †***Hippoglossus antiquus*** Jordan 1924, neotype, CAS 55478 (SU 609, 196), head of right counterpart. Jordan (1924) recognized SU 153 (603), body fragment of left counterpart as the holotype, but since its whereabouts is unknown, we establish the only other known specimen, CAS 55478, as a neotype (see Remarks).

Referred Specimens in Jordan (1924): CAS 55478 (SU 609,196), head of right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens in David (1943): None, however she noted there is a small specimen from a locality in Southern California. No other information was given.

Remarks: Jordan (1925) assigned SU 609 as the type for the genus †***Vorator*** and SU 603 as the type species of †***V. antiquus***. David (1943) mistakenly listed CAS 55478 (SU 609, 196) as the holotype. Chanet and Schultz (1994:102) mentioned, without comment, that †***Vorator* (= *Hippoglossoides*) *antiquus*** (Jordan 1925) was present in the Monterey Formation (Middle Miocene) of California, but they did not cite David (1943), thus we treat David as the last reviser.

Paralichthys californicus (Ayres 1859)

Selected References

Paralichthys californicus (Ayres 1859): Fitch and Reimer 1967:79, 82, 84, table 1, fig. 20.
?***Paralichthys californicus*** (Ayres): Fitch and Lavenberg 1971:39.

Type Specimen: Extant, ***Hippoglossus californicus*** Ayres, no types known (Eschmeyer 1998:309).

Type Locality: San Francisco Bay, California.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; three otoliths (one shown in fig. 4). **Bothidae**.

Referred Specimens in Fitch and Lavenberg (1971:39): Otoliths of ***Paralichthys*** have been found in Miocene deposits near Bakersfield, California, but they may not be from ***P. californicus***.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***P. californicus*** from this locality is questionable.

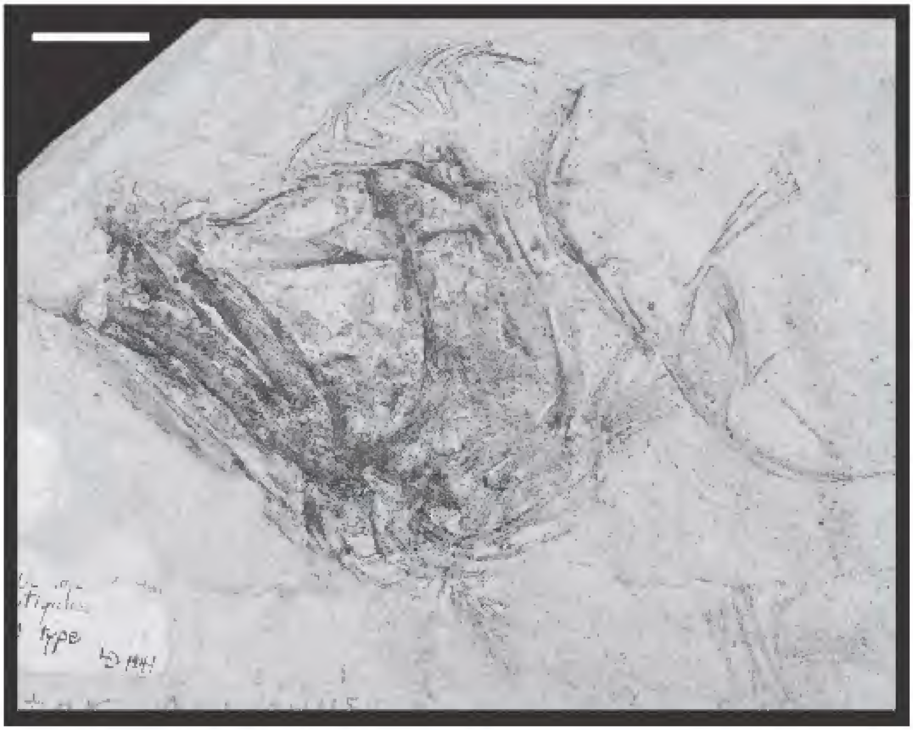


FIGURE 101. †*Paralichthys antiquus* (Jordan 1924), neotype, CAS 55478 (from color image provided by CAS); scale bar equals 3 cm.

***Paralichthys* sp.**: Boessenecker 2011:18-19, Figs. 7.3-7.4

Referred Specimens in Boessenecker (2011): From UCMP locality V99839, south of Halfmoon Bay, Purisima Formation, mid-Pliocene, San Mateo County; UCMP 219067, vertebra.

Genus †*Evesthes* Gilbert 1910

†*Evesthes jordani* Gilbert 1910

Selected Synonymy & References

†***Evesthes jordani*** Gilbert 1910:407, pls. 41, 42 (restoration).
†***Evesthes jordani*** Gilbert: Jordan and Gilbert 1919a:58, pls. 25, 26 (restoration).
†***Evesthes jordani*** Gilbert: Jordan and Gilbert 1920:37-38, pl. 25.
†***Evesthes jordani*** Gilbert: Jordan 1921a:263, pl. 34 (restoration).
†***Evesthes hooveri*** Jordan *in* Jordan and Gilbert 1920:38, pl. 26: David 1943:165.
†***Evesthes hooveri*** Jordan: Jordan 1921a:263, pls. 11, 35 (restoration).
†***Evesthes jordani*** Gilbert: David 1943:165, text-figs. 36a, b.
†***Evesthes jordani*** Gilbert: Chanet and Schultz 1994:102.

Type Specimen: †*Evesthes jordani* Gilbert 1910, holotype, Los Angeles High School (Science and Arts Museum) specimen 2460, right counterpart, whereabouts unknown.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimens of †*E. jordani* in Jordan and Gilbert (1919a): None.

Referred Specimens of †*E. jordani* in Jordan and Gilbert (1920): From Lompoc, Monterey Formation, Late

Miocene, Santa Barbara County; CAS 55421 (SU 509, 197), complete left counterpart (pl. 25, incorrectly labeled pl. 24 in text) and five specimens with whereabouts unknown, SU 33, 220, 276, 296, and 510.

Referred Specimens of †***E. jordani*** in Jordan (1921a): None.

Referred Specimens and Holotype of †***E. hooveri*** (Jordan *in* Jordan and Gilbert 1920) reidentified by David (1943) as †***E. jordani***: From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 70080 (SU 512, 152), holotype, complete right counterpart (pl. 26). No referred specimens. See Remarks section.

Referred Specimens of †***E. hooveri*** in Jordan (1921a): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; two specimens with whereabouts unknown, SU 53, partial left counterpart (pl. 11) and SU 547.

Referred Specimens of †***E. jordani*** in David (1943): From Lompoc, Monterey Formation, Late Miocene, Santa Barbara County; CAS 70080 (SU 512, 152), holotype of †***E. hooveri***, right counterpart; CAS 55421 (SU 509, 197, (text-fig. 36b), fairly complete left counterpart; CAS 70083 (SU 199), complete right counterpart; SU 198, left counterpart (see Remarks). Also, LACM (CIT) 10235, left counterpart (text-fig. 36a).

Remarks: Gilbert (1909) published a preliminary note on †***E. jordani***, although figured, no name was assigned. Jordan *in* Jordan and Gilbert (1920) listed the specimen number of the holotype of †***E. hooveri*** as SU 512 in the text, but in the legend of plate 26 as SU 307. SU 198 is in the CAS collection, but no CAS number and not in its database. Chanet and Schultz (1994:102) mentioned that †***Evesthes jordani*** was present in the Monterey Formation (Middle Miocene) of California and that †***E. hooveri*** was too incomplete for comparison to the pleuronectiforms in their study.

Genus ***Citharichthys*** Bleeker 1862
Citharichthys sordidus (Girard 1854b)

Selected References (fossils only)

Citharichthys sordidus (Girard): Fitch: 1967:10.
Citharichthys sordidus (Girard): Fitch and Reimer 1967:79, 82-84, table 1, fig. 17.
Citharichthys sordidus (Girard): Fitch: 1968:11.
Citharichthys sordidus (Girard): Downs 1968:53, text-fig. 25F.
Citharichthys sordidus (Girard): Fitch and Lavenberg 1971:43.
Citharichthys sordidus (Girard): Nolf: 1985:104.

Type Specimen: Extant, ***Psettichthys sordidus*** Girard 1854, no types known (Eschmeyer 1998:1580).

Type Locality: San Francisco, California.

Referred Specimens in Fitch (1967:10): No specific specimens. Otoliths of ***C. sordidus*** are abundant in southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; seven otoliths (one shown in fig. 17) (see Remarks). **Bothidae**.

Referred Specimens in Fitch (1968:11): Same information as in Fitch (1967) above.

Referred Specimens in Downs (1968): One otolith (text-fig. 25F). The figure legend gives the general age as Pliocene and Pleistocene for the specimen with no specific locality.

Referred Specimens in Fitch and Lavenberg (1971:43): The authors state otoliths of ***C. sordidus*** have been identified from many Pliocene deposits throughout California (see Remarks).

Referred Specimens in Nolf (1985:104): Cites Fitch (1967) that otoliths of ***C. sordidus*** have been reported from the Pliocene of California.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***C. sordidus*** from this locality is questionable, especially since no other Neogene locality was given.

Citharichthys stigmaeus Jordan and Gilbert 1882

Selected References (fossils only)

Citharichthys stigmaeus Jordan and Gilbert 1882: Fitch 1967:10.
Citharichthys stigmaeus Jordan and Gilbert: Fitch and Reimer 1967:79, 83-84, table 1, fig. 14.
Citharichthys stigmaeus Jordan and Gilbert: Fitch 1968:11.
Citharichthys stigmaeus Jordan and Gilbert: Fitch and Lavenberg 1975:33.
Citharichthys stigmaeus Jordan and Gilbert: Nolf 1985:104.

Type Specimen: Extant, ***Citharichthys stigmaeus*** Jordan and Gilbert 1882, holotype, USNM 31099 (Eschmeyer 1998:1612).

Type Locality: Santa Barbara, California.

Referred Specimens in Fitch (1967:10): No specific specimens. Otoliths of ***C. stigmaeus*** have been found in many southern California Pliocene and Pleistocene deposits.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; 24 otoliths (one shown in fig. 44) (see Remarks). **Bothidae**.

Referred Specimens in Fitch (1968:11): Same information as in Fitch (1967) above.

Referred Specimens in Fitch and Lavenberg (1975:33): No specific specimens, but otoliths of ***C. stigmaeus*** are abundant in many Pliocene deposits throughout California.

Referred Specimens in Nolf (1985:104): Cites Fitch (1967) that otoliths of ***C. stigmaeus*** have been reported from the Pliocene of California.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***C. stigmaeus*** from this locality is questionable, especially since no other Neogene locality was given.

Citharichthys xanthostigma Gilbert 1890

Selected References (fossils only)

Citharichthys xanthostigma Gilbert: Fitch 1968:11.
Citharichthys xanthostigma Gilbert: Nolf 1985:104.

Type Specimen: Extant, ***Citharichthys xanthostigma*** Gilbert 1890, lectotype, USNM 4408 (Eschmeyer 1998:1802).

Type Locality: Magdalena Bay, Baja California, Mexico.

Referred Specimens in Fitch (1968:11): No specific specimens. Otoliths of ***C. xanthostigma*** are fairly abundant in several southern California Pliocene and Pleistocene deposits (see Remarks).

Referred Specimens in Nolf (1985:104): Cites Fitch (1968) that otoliths of ***C. xanthostigma*** have been reported from the Pliocene of California.

Remarks: Because Fitch (1968) did not give a specific fossil locality containing otoliths of ***X. xanthostigma***, its presence in the Neogene of California is questionable.

***Citharichthys* sp.**

Referred Specimens in Fitch and Reimer (1967:79, 83-84, table 1): From LACMIP locality 423 (= LACM locality 245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; nine badly preserved otoliths (unfigured) (see Remarks). **Bothidae**.

Referred Specimens in Fitch and Lavenberg (1971:43): Authors state Miocene deposits near Bakersfield, California, contain otoliths of ***Citharichthys* sp.** and they definitely are not remains of ***C. sordidus***.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***Citharichthys* sp.** from this locality is questionable.

Family **Pleuronectidae**

Genus ***Pleuronichthys*** Girard 1854a
†***Pleuronichthys veliger*** (Jordan *in* Jordan and Gilbert 1920)

Figure 102

Selected Synonymy & References

†***Zororhombus veliger*** Jordan ***in*** Jordan and Gilbert 1920:39, pl. 27.
†***Zororhombus veliger*** Jordan: Jordan 1921a:264, pl. 33 (restoration).
†***Zororhombus veliger*** Jordan: Jordan 1921b:463, two unnumbered figs.
†***Pleuronichthys*** **(*Zororhombus*)** ***veliger*** (Jordan): David 1943:167-168, text-fig. 37.
†***Zororhombus veliger*** Jordan: Chanet and Schultz 1994:102.

Type Specimen: †***Zororhombus veliger*** Jordan ***in*** Jordan and Gilbert 1920, holotype, CAS 70003 (SU 230, 195), right counterpart.

Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.

Referred Specimen: SU 21, whereabouts unknown.

Referred Specimens in David (1943): LACM (CIT) 10216, left counterpart (text-fig. 37).

Remarks: Chanet and Schultz (1994:102) mentioned, without comment, that †***Zororhombus veliger*** Jordan was present in the Monterey Formation (Middle Miocene) of California, but they did not cite David (1943), thus we treat David as the last reviser.

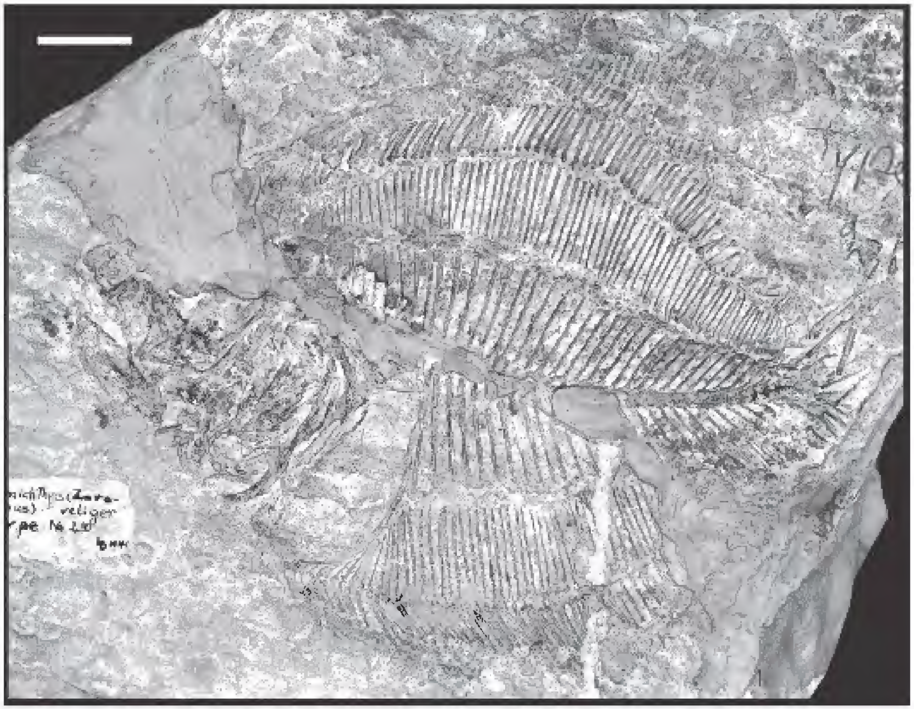


FIGURE 102. †*Pleuronichthys veliger* (Jordan *in* Jordan and Gilbert 1920), holotype, CAS 70003 (from color image provided by CAS); scale bar equals 3 cm.

Genus *Hippoglossoides* Gottsche 1835

†*Hippoglossoides pristinus* (Jordan 1927a)

Figure 103

Selected Synonymy & References

†***Isomma pristinum*** Jordan 1927a:10-11, pl. 3.
?†***Hippoglossoides (Isomma) pristinus*** (Jordan): David 1943:168.
†***Isomma pristina*** (Jordan 1927a): Chanet and Schultz 1994:102.

Type Specimen: †***Isomma pristinum*** Jordan 1927a, holotype, CAS 70081 (SU 450, 200), left counterpart.
Type Locality: Lompoc, Monterey Formation, Late Miocene, Santa Barbara County.
Referred Specimens: None.
Remarks: Chanet and Schultz (1994:102) mentioned, without comment, that †***Isomma pristina*** (Jordan 1927a) was present in the Monterey Formation (Middle Miocene) of California, but they did not cite David (1943), thus we treat David as the last reviser.

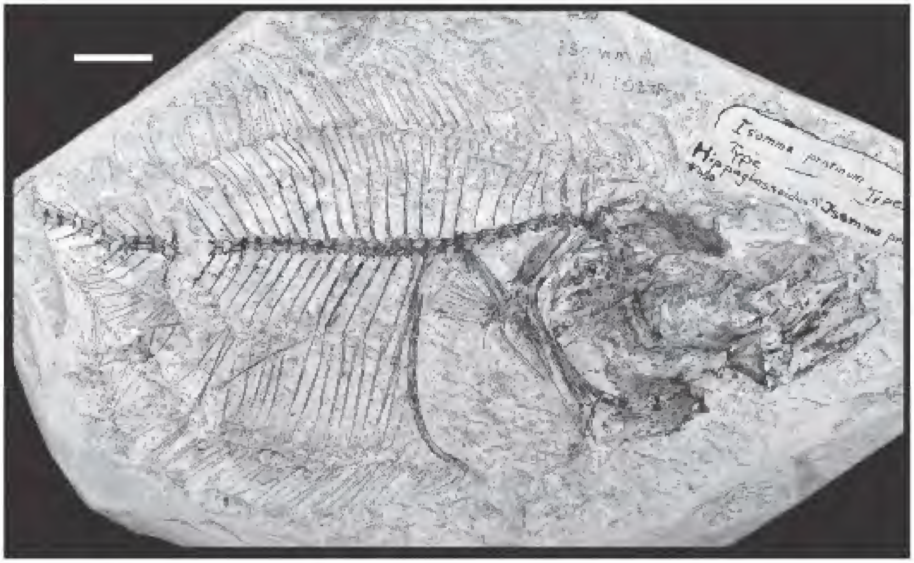


FIGURE 103. †***Hippoglossoides pristinus*** (Jordan 1927a), holotype, CAS 70081 (from color image provided by CAS); scale bar equals 3 cm.

Genus *Lyopsetta* Jordan and Goss in Jordan 1885

Lyopsetta exilis (Jordan and Gilbert 1880c)

Selected Synonymy & References

Hippoglossoides exilis Jordan and Gilbert 1880c:154.
Lyopsetta exilis (Jordan and Gilbert): Fitch 1967:11.
Lyopsetta exilis (Jordan and Gilbert): Fitch and Reimer 1967:79, 83-84, table 1, fig. 21.
Lyopsetta exilis (Jordan and Gilbert): Fitch 1968:12.
Lyopsetta exilis (Jordan and Gilbert): Zinsmeister 1970:124, table 1.
Lyopsetta exilis (Jordan and Gilbert): Nolf 1985:104.

Type Specimen: Extant, ***Hippoglossoides exilis*** Jordan and Gilbert 1880c, syntype, ANSP 8721 and up to 100 others at various depositories (Eschmeyer 1998:554).
Type Locality: Between the Golden Gate Bridge and Point Reyes, California.
Referred Specimens in Fitch (1967:11): No specific specimens. He states that otoliths of ***L. exilis*** have been

found in numerous southern California Pliocene and Pleistocene deposits, with more than 2,000 having been recovered from the Lomita Marl (presumably LACMIP locality 435 [= LACM localities 3065, 3759], Miraleste Canyon, Lomita Marl Formation, Pleistocene, Los Angeles County) (see Remarks).

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one otolith (fig. 21) (see Remarks). **Bothidae**.

Referred Specimens in Fitch (1968:12): Same information as in Fitch (1967) above.

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (=LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Nolf (1985:104): He cites Fitch (1970), a citation we can not locate, that otoliths of ***L. exilis*** have been reported from the Pliocene of California.

Remarks: Locality LACMIP locality 35 (Lomita Marl) is now considered of Pleistocene age (Blake 1991; Dibblee 1999). According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***L. exilis*** from this locality is questionable.

Genus ***Glyptocephalus*** Gottsche 1835

Glyptocephalus zachirus Lockington 1879a

Selected References (fossils only)

Glyptocephalus zachirus Lockington 1879a: Fitch 1967:11.
Glyptocephalus zachirus Lockington: Fitch 1968:12.
Glyptocephalus zachirus Lockington: Zinsmeister 1970:124, table 1.
Glyptocephalus zachirus Lockington 1879a: Nolf 1985:104.

Type Specimen: Extant, ***Glyptocephalus zachirus*** Lockington 1879a, six syntypes, whereabouts unknown (Eschmeyer 1998:1810).

Type Locality: Markets of San Francisco.

Referred Specimens in Fitch (1967:11): No specific specimens. He states that otoliths of ***G. zachirus*** are abundant in some California Pliocene and Pleistocene deposits, with over 700 having been recovered from the Lomita Marl (presumably LACMIP locality 435 [= LACM localities 3065, 3759], Miraleste Canyon, Lomita Marl Formation, Pleistocene, Los Angeles County) (see Remarks).

Referred Specimens in Fitch (1968:12): Same information as in Fitch (1967) above.

Referred Specimens in Zinsmeister (1970:124, table 1): From LACMIP locality 471 (= LACM locality 3802), Upper Newport Bay (= Newport Back Bay Cliffs), Fernando Formation, Plio-Pleistocene, Orange County; no individual specimens mentioned, only the presence of the genus in the deposit. He did not distinguish between teeth and otoliths as remains.

Referred Specimens in Nolf (1985:104): Cites Fitch (1967) that otoliths of ***G. zachirus*** have been reported from the California Pliocene.

Remarks: Locality LACMIP locality 435 (Lomita Marl) is now considered Pleistocene (Blake 1991; Dibblee 1999).

Genus ***Microstomus*** Gottsche 1835

Microstomus pacificus (Lockington 1879b)

Selected Synonymy & References (fossils only)

Glyptocephalus pacificus Lockington 1879b:254.
Microstomus pacificus (Lockington): Eschmeyer and Herald 1983:290.
Microstomus pacificus (Lockington): Fitch and Lavenberg 1971:108.

Type Specimen: Extant, ***Glyptocephalus pacificus*** Lockington 1879b, syntypes, whereabouts unknown (Eschmeyer 1998:1267).

Type Locality: Markets of San Francisco, California.

Referred Specimens in Fitch and Lavenberg (1971:108): No specific specemens, only mentioned that otoliths of ***M. pacificus*** have been found in several Pliocene and Pleistocene deposits in southern California, but they are not common.

Distribution of Neogene ***M. pacificus*** outside of California: None known.

Remarks: Because Fitch and Lavenberg (1971) listed no specific locality with remains of ***M. pacificus***, its presence in the California Neogene is questionable.

Genus ***Parophrys*** Girard 1854a
Parophrys vetulus Girard 1854a

Selected References

Parophrys vetulus Girard 1854a: Fitch and Reimer 1967:79, 83-84, table 1, fig. 19.

Type Specimen: Extant, ***Parophrys vetulus*** Girard 1854a, no types known (Eschmeyer 1998:1758).

Type Locality: San Francisco, California.

Referred Specimens in Fitch and Reimer (1967): From LACMIP locality 423 (= LACM locality 3245), Signal Hill (= Interstate 405 and Cherry Avenue, Long Beach), Fernando Formation, Plio-Pleistocene, Los Angeles County; one otolith (fig. 21) (see Remarks). **Bothidae**.

Remarks: According to Powell (1998:70-71), LACMIP locality 423 (= LACM locality 3245) is in Pleistocene strata, therefore a Pliocene record of ***P. vetulus*** from this locality is questionable.

Family **Cynoglossidae**

Genus ***Symphurus*** Rafinesque 1810
Symphurus atricauda (Jordan and Gilbert 1880b)

Selected References

Symphurus atricauda (Jordan and Gilbert 1880b): Fitch and Lavenberg 1975:2.

Type Specimen: Extant, ***Aphoristia atricauda*** Jordan and Gilbert 1880b, holotype, USNM 27396 (Eschmeyer 1998:158).

Type Locality: San Diego Bay, California.

Referred Specimens in Fitch and Lavenberg (1975:52): They mention otoliths of ***S. atricauda*** have been found in several Pliocene deposits in California, and there is a skeletal imprint (no museum number) in a Miocene shale in Palos Verdes, Los Angeles County.

Remarks: Because Fitch and Lavenberg (1975) listed no specific locality with remains of ***S. atricauda***, its presence in the California Neogene is questionable.

***Symphurus* sp.**

Referred Specimens in Stewart and Govean (1998:79A-80A): From LACM locality 6287, 'Santiago Road Overcrossing', La Vida Member, Puente Formation, Late Miocene, Irvine, Orange County; 6 partial skeletons, LACM 140563-140568.

Order **Tetraodontiformes**
Suborder **Balistoidei**
Family **Balistidae**

Genus ***Balistes*** Linnaeus 1758
Balistes polylepis Steindachner 1876

Selected References

Balistes polylepis Steindachner 1876: Fitch and Lavenberg 1971:32; 1975:24.

Type Specimen: Extant, ***Balistes polylepis*** Steindachner, several syntypes, NMW 63496-500 et al. (Eschmeyer 1998:1364)

Type Locality: Magdalena Bay, Baja California, Mexico.

Referred Specimens in Fitch and Lavenberg (1971:32 and 1975:24): No specific specimens, however they state triggerfish teeth, possibly from ***B. polylepis***, have been found in Miocene deposits near Bakersfield, Kern County, and Santa Ana, Orange County, California (see Remarks).

Remarks: Because Fitch and Lavenberg (1971 and 1975) did not give any specific fossil locality containing teeth of ***B. polylepis***, its presence in the Neogene of California is questionable.

Suborder **Tetraodontoidei**

Family **Tetraodontidae**

Genus ***Sphoeroides*** Anonymous 1798
***Sphoeroides* sp.**

Referred Specimens in Fitch and Lavenberg (1975:123): Teeth belonging to ***Sphoeroides*** have been found in some Miocene deposits in California.

Remarks: Because Fitch and Lavenberg (1975) did not give any specific fossil locality containing otoliths of ***Sphoeroides*** sp., its presence in the Neogene of California is questionable.

Family **Molidae**

Family **Molidae** genus and species undetermined: Hakel and Stewart 2002:62A

Referred Specimens: No specific specimens or localities were mentioned, however they documented molids in five Middle to Late Miocene marine formations in southern and central California. The general localities localities were: Round Mountain Silt, Middle Miocene, Kern County; Monterey Formation, Late Miocene, Santa Barbara County; Modelo Formation, Late Miocene, Ventura County; Puente Formation, Late Miocene, Los Angeles County; Topanga Formation, Middle Miocene, Orange County.

ERRONEOUS ACCOUNTS

Order **Cypriniformes**

Family **Cyprinidae**

Genus ***Orthodon*** Girard 1856b
Orthodon* cf. *O. microlepidotus (Ayres 1854)

Selected Synonymy & References

Gila microlepidota Ayres 1954:18.
Orthodon microlepidotus (Ayres):Eschmeyer 1998:1080.
Orthodon* cf. *O. microlepidotus (Ayres): Casteel and Rymer 1975:619-620, fig. 2A.
Orthodon* cf. *O. microlepidotus (Ayres): Casteel and Rymer 1980:232, tables 31 and 32.

Type Specimen: Extant, ***Gila microlepidota*** Ayres, possible syntype, ANSP 5336 (Eschmeyer 1998:1080).

Type Locality: Lower Sacramento and San Joaquin rivers, California (Eschmeyer 1998:1080).

Referred Specimens of ***Orthodon* cf. *O. microlepidotus*** (Ayres) in Casteel and Rymer (1975:619-620, fig. 2A): From USGS vertebrate locality M-1239, Cache Formation, Plio-Pleistocene, Lake County; USNM 184072, partial pharyngeal tooth (fig. 2A).

Remarks: Casteel and Rymer (1980:232, tables 31 and 31) and Rymer (1981) have reassigned USGS vertebrate locality M-1239 to the Lower Lake Formation, Pleistocene, Lake County, therefore this record of ***Orthodon* cf. *O. microlepidotus*** being collected in a Neogene deposit is erroneous.

Order **Myctophiformes**

Family **Myctophidae**

Genus ***Myctophum*** Rafinesque 1810

Myctophum nitidulum Garman 1899

References (fossils only)

Myctophum nitidulum Garman 1899:266; plate 56 (fig. 3)
Myctophum nitidulum Garman: Fitch 1969b:3, 6, 8, table 1, fig. 1d.
Myctophum nitidulum Garman: Nolf 1985:56.

Type Specimen: Extant, ***Myctophum nitidulum*** Garman 1899, holotype, MCZ 28493 (Eschmeyer 1998:1190).

Type Locality: Northeast of Hawaiian Islands.

Referred Specimens in Fitch (1969b:3, 6, 8, table 1, fig. 1d): From LACMIP locality 435, Miraleste Canyon, San Pedro, Lomita Marl, Late Pliocene, Los Angeles County; one otolith (fig. 1d) (see Remarks).

Referred Specimens in Nolf (1985:56): No specific specimens. He mentions that Fitch (1969b) reported otoliths from the California Pliocene (see Remarks).

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***M. nitidulum*** in the Pliocene is erroneous.

Genus ***Parvilux*** Hubbs and Wisner 1964

Parvilux ingens Hubbs and Wisner 1964

Selected References (fossils only)

Parvilux ingens Hubbs and Wisner 1964:451, figs. 1-4, pl. 25 (fig. 1)
Parvilux ingens Hubbs and Wisner: Fitch 1969b:3, 6, table 1, fig. 1i.
Parvilux ingens Hubbs and Wisner: Nolf 1985:57.

Type Specimen: Extant, ***Parvilux ingens*** Hubbs and Wisner 1964, holotype, SIO 57-207 (Eschmeyer 1998:775).

Type Locality: Off southwestern side of Guadalupe Island, Baja California, Mexico.

Referred Specimens in Fitch (1969b:3, 6, table 1, fig. 1i): From LACMIP locality 435, Miraleste Canyon, San Pedro, Lomita Marl, Late Pliocene, Los Angeles County; eight otoliths (one as fig. 1i).

Referred Specimens in Nolf (1985:57): No specific specimens. He refers to the otoliths reported by Fitch (1969b) from the California Pliocene.

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***P. ingens*** in the Pliocene is erroneous.

Genus ***Protomyctophum*** Fraser-Brunner 1949

Protomyctophum crockeri (Bolin 1939)

Selected References (fossils only)

Protomyctophum crockeri (Bolin 1939:98, fig. 4): Fitch 1968:9.
Protomyctophum crockeri (Bolin): Fitch 1969b:3, 8-9, table 1.
Protomyctophum crockeri (Bolin): Nolf 1985:57.

Type Specimen: Extant, ***Electrona crockeri*** Bolin 1939, holotype, SU 33683 (Eschmeyer 1998:428).

Type Locality: Outer Santa Barbara Passage, California.

Referred Specimens in Fitch (1968:9): No specific specimens. He notes that otoliths of ***P. crockeri*** have been found in several southern California Pliocene and Pleistocene deposits, nearly 200 having been recovered from the Lomita Marl (see Remarks).

Referred Specimens in Fitch (1969b:3, 8-9, table 1): From LACMIP locality 435, Miraleste Canyon, San Pedro, Lomita Marl, Late Pliocene, Los Angeles County; 177 otoliths (unfigured) (see Remarks).

Referred Specimens in Nolf (1985:57): No specific specimens. He mentions the otoliths reported by Fitch (1969b) from the California Pliocene (see Remarks).

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***P. crockeri*** in the Pliocene is erroneous.

Order **Cyprinodontiformes**
Suborder **Cyprinodontoidei**

Family **Fundulidae**

Genus ***Fundulus*** Lacepède 1803
†***Fundulus curryi*** Miller 1945

Selected Synonymy & References

†***Fundulus curryi*** Miller 1945:315, fig. 1.
†***Fundulus curryi*** Miller: Smith 1981:table 2.

Type Specimen: †***Fundulus curryi*** Miller 1945, holotype, LACM (CIT) 10239, left counterpart.

Type Locality: LACM (CIT) locality 335, Titus Canyon Formation, Late Eocene, Inyo County, California.

Paratypes: Fom the type locality: LACM (CIT) 10240, 10247, and 10249.

Referred Specimens: From the type locality: LACM (CIT) 10242 and 10246.

Remarks: Miller (1945:316) thought the type locality might possibly be no earlier than Late Pliocene in age, but the Titus Canyon Formation is now considered Late Eocene.

†***Fundulus davidae*** Miller 1945

Selected Synonymy & References

†***Fundulus davidae*** Miller 1945:320.
†***Fundulus davidae*** Miller: Smith 1981:table 2.

Type Specimen: †***Fundulus davidae*** Miller 1945, holotype, LACM (CIT) 10276, right and left counterparts.

Type Locality: LACM locality 5559, near Black Mountain, Early Pleistocene, San Bernardino County, California.

Remarks: Miller (1945:320) thought the type locality could be Pliocene or Early Pleistocene in age.

Genus ***Cyprinodon*** Lacepède 1803
†***Cyprinodon breviradius*** Miller 1945

Selected Synonymy & References

†***Cyprinodon breviradius*** Miller 1945:321, figs. 3, 4.
†***Cyprinodon breviradius*** Miller: Smith 1981:table 2.

Type Specimen: †***Cyprinodon breviradius*** Miller 1945, holotype, LACM (CIT) 10245, right and left counterparts.

Type Locality: LACM (CIT) locality 335, Titus Canyon Formation, Late Eocene, Inyo County, California.

Remarks: Specimen is not of Neogene age.

Order **Stephanoberyciformes**

Family **Melamphaidae**

Melamphaes Günther 1864
Melamphaes bispinosus Gilbert 1915

Synonymy & References

Melamphaes bispinosus Gilbert 1915:325.
Scopelogadus bispinosus (Gilbert): Fitch 1968:11.
Melamphaes bispinosus Gilbert: Eschmeyer 1998:235.

Type Specimen: Extant, ***Melamphaes bispinosus*** Gilbert 1915, holotype, USNM 75809 (Eschmeyer 1998:235).

Type Locality: Off Coronado Island, near San Diego, California.

Referred Specimen in Fitch (1968:11): He states that otoliths have been found in the Lomita Marl, Pliocene (presumably LACMIP locality 435 [= LACM localities 3065, 3759] Miraleste Canyon, Lomita Marl Formation, Pleistocene [Irvingtonian], Los Angeles County).

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***M. bispinosus*** in the Pliocene is erroneous.

Melamphaes lugubris Gilbert 1890

Selected References

Melamphaes lugubris Gilbert 1890:59.
Melamphaes lugubris Gilbert: Fitch 1968:10.

Type Specimen: Extant, ***Melamphaes lugubris*** Gilbert 1890, holotype, USNM 44287 (Eschmeyer 1998:949-950).

Type Locality: California coast south of Point Conception.

Referred Specimens in Fitch (1968:10): No specific specimens. Otoliths have been found infrequently in the Lomita Marl, Pliocene (presumably LACMIP locality 435 [= LACM localities 3065, 3759], Miraleste Canyon, Lomita Marl Formation, Pleistocene [Irvingtonian], Los Angeles County).

Distribution of Neogene ***M. lugubris*** outside of California: None known.

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***M. lugubris*** in the Pliocene is erroneous.

Order **Gasterosteiformes**
Suborder **Gasterosteoidei**

Family **Gasterosteidae**

Genus ***Gasterosteus*** Linnaeus 1758
†***Gasterosteus doryssus*** (Jordan 1907)

Selected Synonymy & References

†***Merriamella doryssa*** Jordan 1907:131, figs. 25-26.
†***Gasterosteus williamsoni leptosomus*** Hay 1907:271, fig. 12.
†***Gasterosteus doryssus*** (Jordan): Jordan 1908:117.
†***Gasterosteus doryssus*** (Jordan): Uyeno and Miller 1963:17, table 1.
†***Gasterosteus doryssus*** (Jordan): Smith 1981:175, table 2.
†***Gasterosteus doryssus*** (Jordan): Bell 1994:438-471, table 15.1, figs. 15.2, 15.4, 15.5.

†***Gasterosteus doryssus*** (Jordan): La Rivers 1994:56.
†***Gasterosteus doryssus*** (Jordan): Frickhinger 1995:752, unnumbered figure.
†***Gasterosteus doryssus*** (Jordan): Bell et al. 2006:562-577, fig. 1.
†***Gasterosteus doryssus*** (Jordan): Bell et al. 2007:189-199, fig. 3.

Type Specimen: †***Merriamella doryssa*** Jordan 1907, holotype, CAS 55494, left counterpart.
Type Locality: Truckee Canal, middle Member, Truckee Formation, Late Miocene, Nevada.
Paratypes: Three specimens, but no museum numbers.
Referred Specimens: Bell et al. (2006:568, appendix) mentioned they studied 4720 specimens, but gave no museum numbers or where the specimens were deposited.
Distribution of Neogene †***G. doryssus*** within California: Frickhinger (1995) figured a single specimen apparently photographed at the USNM, but gives no museum number, from the Miocene of California.
Distribution of Neogene †***G. doryssus*** outside of California: All of the references, except Jordan (1907) and Frickhinger (1995), list the Truckee Formation in Nevada as the only site of distribution for the species. According to La Rivers (1994:59), Jordan apparently confused the town of Truckee, California, with the Truckee Formation that is in Nevada.

Order **Scorpaeniformes**
Suborder **Scorpaenoidei**

Family **Scorpaenidae**
Subfamily **Sebastinae**

Genus †***Sebastavus*** Jordan and Gilbert 1919a
†***Sebastavus elatus*** (Steindachner 1860)

Selected Synonymy & References

†***Sebastavus vertebralis*** Jordan and Gilbert 1919a:50-51, pl. 31 fig. 1.
†***Sebastavus elatus*** (Steindachner 1860): Jordan 1927:13.

Type Specimen: †***Sebastavus elatus*** (Steindachner 1860), holotype, SU 3, right counterpart (see Remarks).
Type Locality: El Modena, Monterey Formation, Late Miocene, Orange County.
Referred Specimens: From type locality: SU 41 (see Remarks section).
Remarks: According to a supplemental note in Jordan (1927:13), the description of †***S. vertebralis*** was mistakenly based on a photograph of a goby from the Miocene of Vienna, Austria. Jordan stated that the specimen is not a goby and placed the Austrian specimen in the genus †***Sebastavus***.

Family **Cottidae**

Genus ***Icelinus*** Jordan 1885
Icelinus burchami Evermann and Goldborough 1907

Selected References (fossils only)

Icelinus burchami Evermann and Goldborough 1907: Fitch 1967:19.
Icelinus burchami Evermann and Goldborough: Fitch 1968:18.
Icelinus burchami Evermann and Goldborough: Nolf 1985:78.

Type Specimen: Extant, ***Icelinus burchami*** Evermann and Goldborough, holotype, USNM 57822 (Eschmeyer 1998:296).
Type Locality: Off Loring, Alaska.
Referred Specimens in Fitch (1967:19): From LACMIP locality 435, Miraleste Canyon, San Pedro, Lomita

Marl, Late Pliocene, Los Angeles County; otoliths, but no specific specimens mentioned (see Remarks).

Referred Specimens in Fitch (1968:18): He notes that about 600 otoliths of ***I. burchami*** have been recovered from the Lomita Marl (see entry above and Remarks).

Referred Specimens in Nolf (1985:78): No specific specimens. He cites Fitch (1968) that otoliths of ***I. burchami*** have been found in the California Pliocene.

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***I. burchami*** in the Pliocene is erroneous.

Order **Perciformes**

Family **Apogonidae**

Genus ***Xeneretmus*** Gilbert *in* Jordan 1903
***Xeneretmus* sp.**

Referred Specimens in Fitch (1968:21): No specific specimens. He states that otoliths of ***Xeneretmus*** have been found in the Lomita Marl, San Pedro (presumably LACMIP locality 435 [= LACM localities 3065, 3759], Miraleste Canyon, Lomita Marl Formation, Pleistocene, Los Angeles County).

Remarks: LACMIP locality 435 (Lomita Marl, Los Angeles County) is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the record of ***Xeneretmus* sp.** in the Pliocene is erroneous

Family **Gobiidae genus and species uncertain**

Selected Synonymy & References

†***Gobius oblongus*** Steindachner 1860:565, pl.1, fig. 3.
†***Aboma antiqua*** Jordan and Gilbert 1919a:56, pl. 29, fig. 1.

Type Specimen: †***Gobius oblongus*** Steindachner 1860, holotype. **Gobiidae**.

Type Locality: Hernalser Tegel, Vienna Basin, Upper Miocene, Austria.

Remarks: Jordan and Gilbert (1919a:56, pl. 29, fig. 1) made a confusing error. According to Duncker (1923) and Jordan (1927a, b), they described a fossil (presumably from Bairdstown [= El Sereno neighborhood of east Los Angeles], Monterey Formation, Late Miocene, Los Angeles County). based on a photograph. They identified the fossil as a new species, †***Aboma antiqua***. Unfortunately the photograph was an illustration of a species figured and described by Steindachner (1860) from the Miocene of Austria. Jordan (1927a) stated that the name †***Gobius oblongus*** was preoccupied and the species belongs to neither ***Gobius*** or ***Aboma*** and its relations among the **Gobiidae** are not clear. We make no attempt to correct the taxonomy, thus we place it in **Gobiidae,** genus and species uncertain.

Order **Pleuronectiformes**

Family **Pleuronectidae**

Genus ***Atheresthes*** Jordan and Gilbert 1880d
Atheresthes stomias (Jordan and Gilbert 1880e)

Selected Synonymy & References

Platysomatichthys stomias Jordan and Gilbert 1880e:301.
Atheresthes stomias (Jordan and Gilbert): Fitch 1967:19-21.
Atheresthes stomias (Jordan and Gilbert): Fitch 1968:12.
Atheresthes stomias (Jordan and Gilbert): Nolf 1985:104.

Type Specimen: Extant, ***Platysomatichthys stomias*** Jordan and Gilbert 1880e, holotype, ?USNM 27186 (Eschmeyer 1998:1616).

Type Locality: Just outside Golden Gate Bridge, San Francisco, California.

Referred Specimens in Fitch (1967:19-21): From LACMIP locality 435 (= LACM localities 3065, 3759), Miraleste Canyon, Lomita Marl Formation, Pleistocene (Irvingtonian), Los Angeles County; otoliths (no specific specimens mentioned) (see Remarks).

Referred Specimens in Fitch (1968:12): Cites Fitch (1967) that ***A. stomias*** otoliths were found in the Lomita Marl, but they are rare (see Remarks).

Referred Specimens in Nolf (1985:104): Cites Fitch(1968) that otoliths of ***A. stomias*** have been reported from the California Pliocene.

Remarks: Fitch (1967, 1968) believed locality LACMIP locality 435 (Lomita Marl) was of Pliocene age, but it is now considered Pleistocene (Blake 1991; Dibblee 1999), therefore the presence of ***A. stomias*** in the Neogene is errroneus.

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Appendix

SUMMARY CATALOG

Abbreviations used in Catalog

T = tooth
U = holotype whereabouts unknown
B = bones
C = counterpart (imprint)
M-P = Mio-Pliocene
O = otolith
SC = scute
SCL = scale
T = tooth
SW = marine
FW = fresh water
† = extinct

AMNH—American Museum of Natural History, New York, New York
ANSP—Academy of Natural Science, Philadelphia (now of Drexel University), Pennsylvania
CAS—California Academy of Sciences, San Francisco, California
LACM—Natural History Museum of Los Angeles County, California
UO—University of Oregon Museum of Natural History, Eugene, Oregon
USC—University of Southern California, Los Angeles, California
USNM—United States National Museum, Washington, DC
YPM—Peabody Museum, Yale University, New Haven, Connecticut

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
Acipenseriformes	Acipenseridae	undet.	undet.	-	B, SC	+	-	+	+	+	
Elopiformes	Elopidae	†*Ectasis*	*proriger*	U	C	+	-	?	?	-	
	Megalopidae	†*Megalops*	*vigilax*	CAS	C	+	-	+	-	-	
Anguilliformes	Muraenidae	*Gymnothorax*	*mordax*	-	T	+	-	-	?	-	
	†Deprandidae	†*Deprandus*	*lestes*	U	C	+	-	+	-	-	
Albuliformes	Halosauridae	†*Laytonia*	*californica*	LACM	C	+	-	+	-	-	
		†*Laytonia*	cf. *californica*	-	C, SCL	+	-	-	-	-	
		†*Laytonia* ?	*zemorrensis*	U	SCL	+	-	-	-	-	
Clupeiformes	Engraulidae	*Engraulis*	*mordax*	-	O	+	-	-	+	+	
	Clupeidae	†*Alisea*	*grandis*	CAS	C	+	-	+	-	-	
		Clupea	*pallasii*	-	O	+	-	-	+	+	
		†*Clupea*	*tiejei*	LACM	C	+	-	+	-	-	
		†*Etringus*	*scintillans*	CAS	C, SCL	+	-	+	-	-	
		†*Etringus*	sp.	-	B, SCL	+	-	+	-	-	
		†*Ganoessus*	*clepsydra*	CAS	C	+	-	?	-	-	
		†*Ganoessus*	*meiklejohni*	CAS	C	+	-	+	-	-	
		†*Ganoessus*	*michaelis*	CAS	C	+	-	+	-	-	
		†*Ganolytes*	*aratus*	CAS	C, SCL	+	-	+	-	-	
		†*Ganolytes*	*cameo*	CAS	C, SCL	+	-	+	?	-	
		†*Ganolytes*	cf. *cameo*	-	SCL	+	-	+	-	-	
		†*Ganolytes*	sp	-	SCL	+	-	+	-	-	
		†*Opisthonema*	*palosverdensis*	LACM	C	+	-	?	?	?	
		†*Quisque*	*gilberti*	CAS	C	+	-	+	-	-	
		†*Xyne*	*grex*	CAS	B, C, SCL	+	-	+	-	-	
		†*Xyrinius*	*houshi*	U	C	+	-	+	-	-	
		†*Xyrinius*	*barbarae*	U	C	+	-	+	-	-	
		†*Xyrinius*	*elmodenae*	CAS	C	+	-	+	-	-	
	Clupeidae	undet.	undet.	-	SCL	+	-	+	-	-	
Cypriniformes	Catostomidae	†*Catostomus*	*cristatus*	AMNH	B	-	+	-	+	-	
		†*Catostomus*	*shoshonensis*	AMNH	B	-	+	-	+	-	
		Catostomus	sp.	-	B	-	+	-	+	+	
		Chasmistes	cf. *cujus*	-	B	-	-	-	+	-	
		Chasmistes	sp.	-	B	-	+	-	+	-	
		Xyrauchen	*texanus*	-	C	-	+	-	+	?	

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
	Cyprinidae	†*Acrocheilus*	cf. *latus*	-	B	-	+	-	+	-	-
		†*Acrocheilus*	sp.	-	?	-	+	-	+	-	-
		Gila	*coerulea*	-	B	-	+	-	-		+
		†*Lavinia*	sp.	-	?	-	+	-	-	-	-
		Orthodon	sp.	-	T	-	+	+	-	+	?
		†*Ptychocheilus*	cf. *arciferus*	-	B	-	+	-	-	+	-
		†*Ptychocheilus*	sp.	-	?	-	+	-	-	-	?
		Siphateles	*bicolor*	-	B	-	+	-	-	+	+
		Siphateles	*mohavensis*	-	?	-	+	-	-	+	+
		†*Siphateles*	sp.	-	B	-	+	-	+	-	-
Argentiniformes	Argentinidae	*Argentina*	sp.	-	?	+	-	+	-	-	?
	Microstomatidae	†*Bathylagus*	*angelensis*	CAS	C	+	-	+	-	-	-
		Bathylagus	sp.	-	?, O	+	-	+	-	-	?
		†*Quaesita*	*quisquilia*	CAS	C	+	-	+	-	-	-
		†*Quaesita*	*alhambrae*	U	C	+	-	?	?	-	-
		†*Quaesita*	*fragilis*	CAS	C	+	-	?	?	-	-
	Bathylaginae	undet.	undet.	-	?	+	-	+	-	-	?
Salmoniformes	Osmeridae	*Spirinchus*	*starksi*	-	O	+	-	-	+	-	+
		Spirinchus	sp.	-	O	-	+	-	+	-	?
	Salmonidae	†*Oncorhynchus*	*rastrosus*	UO	B	+	?	+	?	-	-
		†*Oncorhynchus*	*lacustris*	USNM	B	-	+	-	+	-	-
		†*Oncorhynchus*	sp.	-	?	-	+	-	+	-	?
Stomiiformes	Gonostomatidae	†*Cyclothone*	*solitudinis*	CAS	C	+	-	+	-	-	-
		†*Cyclothone*	cf. *solitudinis*	-	C	+	-	+	-	-	-
		†*Cyclothone*	sp.	-	C	+	-	+	-	-	?
	Sternoptychidae	†*Argyropelecus*	*bullockii*	LACM	C	+	-	+	-	-	-
		Argyropelecus	*affinis*	-	C	+	-	+	-	-	+
		Argyropelecus	sp.	-	C	+	-	+	-	-	?
	Stomiidae	†*Chauliodus*	*eximius*	CAS	C	+	-	+	-	-	-
Aulopiformes	Paralepididae	†*Drimys*	*defensor*	U	C	+	-	+	-	-	-
Myctophiformes	Myctophidae	*Benthosema*	sp.	-	O	+	-	-	+	-	?
		Electrona	*rissoi*	-	O	+	-	-	-	+	+
		Hygophum	sp.	-	O	+	-	+	-	-	?
		Myctophum	sp.	-	O	+	-	+	-	-	?
		Symbolophorus	*californiensis*	-	O	+	-	-	-	-	+
		Symbolophorus	sp.	-	?, C, O	+	-	+	+	?	?
		Tarletonbeania	*crenularis*	-	O	+	-	-	-	+	+

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
		Ceratoscopelus	*townsendi*	-	O	+	-	-	+	+	
		†*Diaphus*	*bolini*	U	C, SCL	+	-	+	-	-	
		Diaphus	*theta*	-	O	+	-	-	+	+	
		Diaphus	sp.	-	O	+	-	+	-	-	
		Lampadena	*urophaos*	-	O	+	-	-	?	?	
		†*Lampanyctus*	*petrolifer*	U	C	+	-	+	-	-	
		Lampanyctus	*regalis*	-	O	+	-	-	+	-	
		†*Lampanyctus*	*remifer*	CAS	C	+	-	+	-	-	
		Lampanyctus	*ritteri*	-	O	+	-	-	?	+	
		Lampanyctus	sp.	-	C, O	+	-	+	-	-	
		Notoscopelus	*resplendens*	-	O	+	-	-	+	-	
		Notoscopelus	sp.	-	O	+	-	+	-	-	
		Stenobrachius	*leucopsarus*	-	O	+	-	-	+	+	
		Triphoturus	*mexicanus*	-	O	+	-	-	+	-	
	Myctophidae	undet.	undet.	-	?	+	-	+	-	-	
	Lampanyctinae	undet.	undet.	-	C	+	-	+	-	-	
Lampriformes	Lampridae	†*Lampris*	*zatima*	CAS	C	+	-	+	-	-	
Gadiformes	Moridae	*Physiculus*	*rastrelliger*	-	O	+	-	-	+	+	
	Moridae	undet.	undet.	-	O, C, ?	+	-	?	+	?	
	Macrouridae	†*Bolbocara*	*gyrinus*	CAS	C	+	-	+	-	-	
		†*Amblygoniolepidus*	*polystichus*	LACM	SCL	+	-	+	-	-	
		†*Homeocoryphaenoides*	*chiasmacanthus*	LACM	SCL	+	-	+	-	-	
		†*Calilepidus*	*tauxei*	LACM	SCL	+	-	+	-	-	
		†*Leptacantholepidus*	*delmontianus*	LACM	SCL	+	-	+	-	-	
		†*Leptacantholepidus*	*rotundus*	LACM	SCL	+	-	+	-	-	
		†*Homeomacrurus*	*fernandensis*	LACM	SCL	+	-	+	+	-	
		†*Promacrurus*	*zemorrianus*	U	SCL	+	-	+	-	-	
		†*Promacrurus*	*newmani*	LACM	SCL	+	-	+	-	-	
		†*Promacrurus*	*saucesianus*	LACM	SCL	+	-	+	-	-	
		†*Homeonezumia*	*multispinosus*	LACM	SCL	+	-	+	-	-	
	Macrouridae	undet.	undet.	-	SCL	+	-	+	-	-	
	Merlucciidae	†*Promerluccius*	*venturaensis*	LACM	SCL	+	-	-	+	-	
		Merluccius	*productus*	-	O	+	-	-	+	+	
	Gadidae	†*Eclipes*	*santamonicae*	LACM	C	+	-	+	-	-	
		†*Eclipes*	*veternus*	CAS	C	+	-	+	-	-	
		†*Eclipes*	*manni*	CAS	C	+	-	+	-	-	
		†*Eclipes*	*extensus*	CAS	C	+	-	+	-	-	

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
		†*Eclipes*	cf. *extensus*	-	C	+	-	+	-	-	
		†*Eclipes*	sp.	-	C	+	-	?	-	-	
		†*Progadus*	*pliocenicus*	LACM	SCL	+	-	-	+	-	
		†?*Progadus*	*miocenicus*	U	SCL	+	-	+	-	-	
		†*Arnoldites*	*iniistia*	CAS	C	+	-	-	+	-	
		Microgadus	*proximus*	-	O	+	-	-	?	+	
Ophidiiformes	Bythitidae	*Brosmophycis*	*marginata*	-	O	+	-	-	?	?	
	Ophidiidae	*Chilara*	*taylori*	-	O	+	-	-	+	+	
		Ophidion	*scrippsae*	-	O	+	-	-	-	?	
		†*Ophidion*	*ozymandias*	CAS	C	+	-	+	-	-	
Batrachoidiformes	Batrachoididae	*Porichthys*	*notatus*	-	O	+	-	-	-	?	
		Porichthys	*myriaster*	-	O	+	-	-	-	?	
Lophiiformes	Lophiidae	†*Emmachaere*	*rhachites*	CAS	C	+	-	+	-	-	
	Oneirodidae	*Chaenophryne*	aff. *melanorhabdus*	-	C	+	-	+	-	-	
		Leptacanthichthys	cf. *gracilispinis*	-	C	+	-	+	-	-	
		Oneirodes	sp.	-	C	+	-	+	-	-	
	Linophrynidae	*Acentrophryne*	sp.	-	C	+	-	+	-	-	
		Borophryne	cf. *apogon*	-	C	+	-	+	-	-	
		Linophryne	cf. *indica*	-	C	+	-	+	-	-	
Mugiliformes	Mugilidae	undet.	undet.	-	O	?	?	+	-	-	
Atheriniformes	Atherinopsidae	*Atherinops*	*affinis*	-	O	+	-	-	+	-	
		Atherinops	sp.	-	?	+	-	+	-	-	
		Atherinopsis	*californiensis*	-	O	+	-	-	+	-	
		Atherinopsis	sp.	-	?	+	-	+	-	-	
		Leuresthes	*tenuis*	-	O	+	-	-	?	-	
		†*Zanteclites*	*hubbsi*	CAS	C	+	-	+	-	-	
		†*Zanteclites*	sp.	-	SCL	+	-	+	-	-	
Beloniformes	Hemiramphidae	†*Euleptorhamphus*	*peronides*	CAS	C	+	-	+	-	-	
		†*Rogenites*	*bowersi*	CAS	C	+	-	+	-	-	
		†*Zelosis*	*hadleyi*	CAS	C	+	-	+	-	-	
	Scomberesocidae	†*Scomberesox*	*edwardsi*	CAS	C	+	-	+	-	-	
		†*Scomberessus*	*acutillus*	CAS	C	+	-	+	-	-	
	†Forficidae	†*Rhomurus*	*fulcratus*	CAS	C	+	-	+	-	-	
		†*Forfex*	*hypuralis*	CAS	C	+	-	?	-	-	
		†*Zelotichthys*	*alhambrae*	CAS	C	+	-	?	-	-	

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
Cyprinodontiformes	Fundulidae	†*Fundulus*	*eulepis*	U	C	-	+	+	-	-	-
		Fundulus	sp.	-	C	-	+	M-P	M-P	-	?
		?*Fundulus*		-	C	?	?	+	-	-	?
	Goodeidae	†*Empetrichthys*	*erdisi*	CAS	C	-	+	M-P	M-P	-	-
Stephanoberyciformes	Melamphaidae	†*Scopelogadus* (?)	*capistranensis*	YPM	C	+	-	+	-	-	-
	Melamphaidae	undet.	undet.	-	C, O	+	-	+	+	+	?
Gasterosteiformes	Gasterosteidae	*Gasterosteus*	*aculeatus*	-	C	+	+	+	+	+	+
		Gasterosteus	cf. *aculeatus*	-	B	-	+	-	-	+	+
		Gasterosteus	sp.	-	B	-	+	+	-	-	?
	Syngnathidae	†*Hipposyngnathus*	*imporcitor*	LACM	C	+	-	+	-	-	-
		†*Syngnathus*	*emeritus*	LACM	C	+	-	+	-	-	-
		†*Syngnathus*	*avus*	CAS	C	+	-	+	-	-	-
		Syngnathus	sp.	-	B	+	-	+	-	-	?
Scorpaeniformes	Scorpaenidae	†*Sebastes*	*apostates*	CAS	C	+	-	+	-	-	-
		†*Sebastes*	*davidi*	CAS	C	+	-	+	-	-	-
		†*Sebastes*	*defunctus*	CAS	C	+	-	+	-	-	-
		Sebastes	*goodei*	-	O	+	-	-	?	?	+
		†*Sebastes*	*ineziae*	CAS	C	+	-	+	-	-	-
		†*Sebastes*	*longirostris*	CAS	C	+	-	+	-	-	-
		†*Sebastes*	*porteousi*	CAS	C	+	-	+	-	-	-
		†*Sebastes*	*thermophilus*	CAS	C	+	-	+	-	-	-
		†*Sebastes*	*velox*	CAS	C	+	-	+	-	-	-
		Sebastes	*paucispinis*	-	O	+	-	?	?	?	+
		†*Sebastes*	*rosae*	U	B	+	-	-	?	-	-
		Sebastes	sp.	-	SCL, O	+	-	+	-	?	?
		†*Sebastinus*	sp.	-	C	+	-	+	-	-	?
		†*Scorpaena*	*ensiger*	CAS	C	+	-	+	-	-	-
		Scorpaena	sp.	-	C	+	-	+	-	-	?
	Scorpaenidae	undet.	undet.	-	C, SCL	+	-	+	-	-	?
	Anoplopomatidae	†*Eoscorpius*	*primaevus*	U	C	+	-	?	-	-	-
	Hexagrammidae	†*Achrestogrammus*	*achrestus*	CAS	C	+	-	+	-	-	-
	Hexagrammidae	undet.	undet.	-	C	+	-	+	-	-	?
	Cottidae	*Artedius*	*notospilotus*	-	O	+	-	-	-	?	+
		Chitonotus	*pugetensis*	-	O	+	-	-	?	-	+
		Cottus	*sp.*	-	B	-	+	-	+	-	?
		Enophrys	*taurinus*	-	O	+	-	-	?	?	+
		Icelinus	*filamentosus*	-	O	+	-	-	?	?	+

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
		Icelinus	*fimbriatus*	-	O	+	-	-	+	-	+
		Icelinus	*quadriseriatus*	-	O	+	-	-	+	-	+
		Icelinus	*tenuis*	-	O	+	-	-	+	-	+
		Leptocottus	*armatus*	-	O	+	-	-	+	-	+
		†*Lirosceles*	*elegans*	CAS	C	+	-	+	-	-	-
		Radulinus	*asprellus*	-	O	+	-	-	+	-	+
	Psychrolutidae	*Malacocottus*	*zonurus*	-	O	+	-	-	?	?	+
	Cottidae?	†*Hayia*	*daulica*	CAS	C	?	-	?	?	-	-
Perciformes	Serranidae	*Paralabrax*	sp.	-	?	+	-	+	-	-	?
		†*Protanthias*	*fossilis*	LACM	C	+	-	+	-	-	-
	Centrarchidae	*Archoplites*	cf. *interruptus*	-	SCL, T	-	+	-	-	+	+
	Apogonidae	†*Eritima*	*evides*	CAS	C	+	-	?	-	-	-
	Pomatomidae	†*Pseudoseriola*	*gilliandi*	LACM	C	+	-	+	-	-	-
		†*Pseudoseriola*	*sanctaeineziae*	CAS	C	+	-	+	-	-	-
		†*Pseudoseriola*	sp.	-	SCL	+	-	+	-	-	-
		†*Lophar*	*miocaenus*	CAS	C	+	-	+?	-	-	-
	Carangidae	†*Decapterus*	*hopkinsi*	U	C	+	-	+	-	-	-
		†*Decapterus*	cf. *hopkinsi*	-	SCL	+	-	+	-	-	-
		Decapterus	sp.	-	SCL	+	-	+	-	-	?
		Caranx	sp.	-	B	+	-	+	-	-	?
		†*Seriola*	*sanctae-barbarae*	U	C	+	-	+	-	-	-
		Seriola	sp.	-	SCL	+	-	+	-	-	?
		Trachurus	*symmetricus*	-	O	+	-	-	+	?	+
	Caristiidae	†*Absalomichthys*	*velifer*	CAS	C	+	-	+	-	-	-
		†*Chalcidichthys*	*mala-copterygius*	LACM	C	+	-	+	-	-	-
	Sparidae	†*Plectrites*	*classeni*	CAS	C	+	-	+	-	-	-
		†*Rythmias*	*starri*	CAS	C	+	-	+	-	-	-
		†*Rythmias*	*gaviotae*	LACM	C	+	-	+	-	-	-
		†*Rythmias*	sp.	-	SCL	+	-	+	-	-	-
	Sciaenidae	†*Genyonemus*	*whistleri*	LACM	C	+	-	+	-	-	-
		Genyonemus	*lineatus*	-	O	+	-	-	+	?	+
		†*Pogonias*	*stringeri*	LACM	O	+	-	+	-	-	-
		Roncador	*stearnsii*	-	O	+	-	-	-	?	+
		†*Seriphus*	*lavenbergi*	LACM	B, O	+	-	+	-	-	-
		Seriphus	*politus*	-	O	+	-	-	+	?	+

Order	Family	Genus	Species	Type fossil depository	Specimen kind	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
		†*Totoaba*	*fitchi*	LACM	O	+	-	+	-	-	-
		†*Lompoquia*	*retropes*	CAS	C, SCL	+	-	+	-	-	-
		†*Lompoquia*	*culveri*	CAS	C, SCL	+	-	+	-	-	-
		†*Lompoquia*	sp.	-	C, SCL	+	-	+	-	-	-
		†*Cynoscion*	*eprepes*	CAS	C	+	-	+	-	-	-
		Atractoscion	*nobilis*	-	O	+	-	-	-	-	+
	†Ioscionidae	†*Ioscion*	*morgani*	U	C	+	-	+	-	-	-
	Embiotocidae	*Amphistichus*	*argenteus*	-	O	+	-	-	+	-	+
		Cymatogaster	*aggregata*	-	O	+	-	-	-	+	+
		Embiotica	*jacksoni*	-	O	+	-	-	?	-	+
		†*Damalichthys*	*saratogensis*	U	B, SCL	?	-	-	-	+	+
		†*Eriquius*	*plectrodes*	CAS	C	+	-	+	-	-	-
		Hysterocarpus	*traskii*	-	?	-	+	-	-	+	+
		Hysterocarpus	cf. *traskii*	-	B, SCL, T	-	+	-	-	+	-
		Rhacochilus	*vacca*	-	O, T	+	-	-	?	?	+
	Embiotocidae	undet.	undet.	-	O	+	-	-	-	?	?
	Labridae	*Halichoeres*	*semicinctus*	-	C	+	-	+	-	-	+
		Oxyjulis	*californica*	-	O	+	-	-	?	?	+
		Semicossyphus	*pulcher*	-	T	+	-	-	?	?	+
	Bathymasteridae	*Rathbunella*	*hypoplecta*	-	O	+	-	-	?	?	+
	Zoarcidae	*Lycodes*	*pacificus*	-	O	+	-	-	-	+	+
	Cryptacanthodidae	*Cryptacanthodes*	*aleutensis*	-	O	+	-	-	?	?	+
	Zaproridae	†*Araeosteus*	*rothi*	CAS	C	+	-	+	-	-	-
	Ammodytidae	*Ammodytes*	*hexapterus*	-	O	+	-	-	?	?	+
	Gobiesocidae	†*Bulbiceps*	*raninus*	U	C	+	-	?	-	-	-
	Gobiidae	*Lepidogobius*	*lepidus*	-	O	+	-	-	-	?	+
		Lethops	*connectens*	-	O	+	-	-	?	?	+
		Rhinogobiops	*nicholsii*	-	O	+	-	-	+	-	+
	†Euzaphlegidae	†*Euzaphleges*	*longurio*	CAS	C, SCL	+	-	+	-	-	-
		†*Thyrsocles*	*kriegeri*	CAS	C	+	-	+	-	-	-
		Zaphlegulus	*venturaensis*	LACM	C	+	-	+	-	-	-
	†Euzaphlegidae	?†*Trossulus*	*exoletus*	CAS	C	+	-	+	-	-	-
	Sphyraenidae	*Sphyraena*	*argentea*	-	O	+	-	-	?	?	+
	Scombridae	†*Scomber*	*sanctae- monicae*	CAS	C	+	-	+	-	-	-
		Scomber	*japonicus*	-	O	+	-	-	-	+	+
		Scomber	cf. *japonicus*	-	C, SCL	+	-	+	-	-	+

Order	Family	Genus	Species	Type fossil	Specimen	SW	FW	Miocene	Pliocene	Plio-Pleistocene	Extant
				Depository	Kind						
		Scomber	sp.	-	C	+	-	+	-	-	?
		†*Sarda*	*stockii*	LACM	C, SCL	+	-	+	-	-	-
		†*Sarda*	cf. *stockii*	-	SCL	+	-	+	-	-	-
		Sarda	sp.	-	?	+	-	+	-	-	?
		†*Ocystias*	*sagitta*	U	C	+	-	+	-	-	-
		†*Xestias*	*iratus*	CAS	C	+	-	+	-	-	-
		†*Tunita*	*octavia*	CAS	C	+	-	+	-	-	-
		†*Tunita*	sp.	-	C	+	-	?	?	?	-
		†*Thunnus*	*starksi*	CAS	C	+	-	+	-	-	-
		Thunnus	sp.	-	C, SCL, B	+	-	+	+	-	?
		†*Ozymandias*	*gilberti*	CAS	C	+	-	+	-	-	-
	Istiophoridae	*Istiophorus*	*platypterus*	-	B	+	-	-	+	-	+
		Makaria	*nigricans*	-	B	+	-	+	-	-	+
	Istiophoridae	undet.	undet.	-	B	+	-	+	+	-	?
Pleuronectiformes	Paralichthyidae	†*Paralichthys*	*antiquus*	CAS	C	+	-	+	-	-	-
		Paralichthys	*californicus*	-	O	+	-	?	-	?	+
		Paralichthys	sp.	-	B	+	-	-	+	-	?
		†*Evesthes*	*jordani*	U	C	+	-	+	-	-	-
		Citharichthys	*sordidus*	-	O	+	-	-	?	?	+
		Citharichthys	*stigmaeus*	-	O	+	-	-	?	?	+
		Citharichthys	*xanthostigma*	-	O	+	-	-	?	-	+
		Citharichthys	sp.	-	O	+	-	+	-	?	?
	Pleuronectidae	†*Pleuronichthys*	*veliger*	CAS	C	+	-	+	-	-	-
		†*Hippoglossoides*	*pristinus*	CAS	C	+	-	+	-	-	-
		Lyopsetta	*exilis*	-	O	+	-	-	-	+	+
		Glyptocephalus	*zachirus*	-	O?	+	-	-	-	+	+
		Microstomus	*pacificus*	-	O	+	-	-	?	?	+
		Parophrys	*vetulus*	-	O	+	-	-	-	?	+
	Cynoglossidae	*Symphurus*	*atricauda*	-	O, C?	+	-	?	?	?	+
		Symphurus	sp.		C	+	-	+	-	-	?
Tetraodontiformes	Balistidae	*Balistes*	*polylepis*	-	T?	+	-	?	-	-	+
	Tetraodontidae	*Sphoeroides*	sp.	-	T	+	-	?	-	-	?
	Molidae	undet	undet	-	?	+	-	+	-	-	?

Systematic Index

A

Abantis 120
  A. velifer 120
Aboma 169
  A. antiqua 169
Absalomichthys 119, 120
  A. velifer 119, 120
Acentrophryne 80, 81
  *A. longiden*s 80
  A. sp. 80, 81
Achrestogrammus 107
  A. achrestus 107
Acipenseridae 8, 11
  genus and sp. undet. 11
Acipenseriformes 8, 11
Acrocheilus 34, 35, 36
  A. latus 34, 35
  A. xestes 34, 35
  A. sp. 35
  A. cf. *A. latus* 34, 35
  A. cf. *A. xestes* 34, 35
Actinopterygii 11
Albuliformes 8, 13
Alciola 153
Alepocephalidae 85
Algansea 37
  A. bicolor 37
Aliciola 152, 153
  A. starksi 152
Alisea 16
  A. grandis 16
Amblygoniolepidus 61, 62
  A. polystichus 61, 62
Ammodytes 139
  A. hexapterus 139
Ammodytidae 139
Amphistichus 132
  A. argenteus 132
Anchybopsis 34
  A. latus 34
Anguilliformes 13
Anoplopomatidae 106, 107
Anoplopomatoidei 106
Anoplopomidae 107
Aphoristia 163
  A. atricauda 163
Apogonidae 71, 114, 169
Araeosteus 138
  A. rothi 138
Archoplites 114
  A. cf. *A. interruptus* 114
Argentina 38
  A. sp. 38
Argentinidae 38
Argentiniformes 38
Argyropelecus 47, 48
  A. affinis 47
  A. bullockii 47
  A. pacificus 48
  A. sp. 48
Aristoscion 131
  *A. eprepe*s 131
Arnoldina 74
  A. iniistia 74
Arnoldites 74
  A. iniistia 74
Artedius 108, 110
  A. notospilotus 108
  A. pugetensis 108
  A. quadriseriatus 110
Atheresthes 169, 170
  A. stomias 169, 170
Atherinidae 83
Atheriniformes 81
Atherinops 81, 82
  A. affinis 81, 82
  A. sp. 82
Atherinopsidae 81
Atherinopsis 81, 82
  A. affinis 82
  A. californiensis 82
  A. sp. 82
  A. tenuis 82
Atkinsonella 129
  A. strigilis 129
Atractoscion 131, 132
  A. nobilis 131, 132
Aulopiformes 50
Auxides 145, 146
  A. bruntoni 146, 147
  A. dasson 146, 147
  A. sanctaemonicae 145, 147
  A. sanctae-monicae 145, 147
Azalois 38, 39
  A. angelensis 38, 39

B

Balistes 163, 164
  B. polylepis 163, 164
Balistidae 163
Balistoidei 163
Bathylagidae 39, 40
Bathylaginae 38, 42
  genus and sp. undet. 42
Bathylagus 38, 39, 40
  B. angelensis 38, 39, 40
  B. (*Quaesita*) *angelensis* 39
  B. sp. 40
Bathymaster 136, 137
  B. hypoplectus 136, 137
Bathymasteridae 136
Batrachoididae 77
Batrachoidiformes 77
Beloniformes 84
Belonidae 84
Beltion 22, 23, 84
  B. peronides 22, 23, 84
Benthosema 50
  B. sp. 50
Bolbocara 61
  B. gyrinus 61
Borophryne 81
  B. cf. *B. apogon* 81
Bothidae 156, 158, 159, 162, 163
Brachyrhynchus 155
  B. belgicus 155
Brosmius 75
  B. marginatus 75
Brosmophycis 75
  B. marginata 75
Brotulidae 71
Bulbiceps 139
  B. raninus 139
Bythitidae 75

C

Calilepidus 62, 63
  C. tauxei 62, 63
Carangidae 117, 118, 119
Caranx 118, 119
  C. sp. 118
  C. symmetricus 119
Caristiidae 119, 120
Catostomidae 8, 9, 30
Catostomus 30, 31, 32, 33, 34
  C. cristatus 30, 31, 32
  C. shoshonensis 32
  C. tahoensis 33
  C. fumeiventris 33
  C. reddingi 31, 32
  C. sp. 30, 31, 32, 33
  C. texanus 34
Centrarchidae 114
Centrarchus 114
  C. interruptus 114
Ceratioidei 80
Ceratoscopelus 52
  C. townsendi 52
Chaenophryne 80, 81
  C. aff. *melanorhabdus* 80
Chalcidichthys 120, 121
  C. malacopterygius 120, 121
Chasmistes 33
  C. batrachops 33
  C. cujus 33
  C. cf. *C. cujus* 8, 33
  C. sp. 33
  C. spatulifer 33
Chauliodontidae 48, 49, 50
Chauliodus 48, 49
  C. barbatus frazeri 48
  C. eximius 48, 49
Cheonda 35
  C. coerulea 35
Chilara 75, 76
  C. taylori 75, 76
Chitonotus 108
  C. pugetensis 108
Chondrostei 11
Citharichthys 158, 159
  C. sordidus 158, 159
  C. sp. 159
  C. stigmaeus 159
  C. xanthostigma 159
Clupea 16, 17
  C. hadleyi 85
  C. pallasii 16, 17
  C. tiejei 17, 28
Clupeidae 8, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 39, 85
  genus and sp. undet. 30
Clupeiformes 8, 15
Cobitopsidae 87
Coronadus 117, 146
  C. agilis 117
  C. stocktoni 146, 147
Corvina 126

  C. stearnsii 126
Coryphopterus 140
  C. nicholsii 140
Cottidae 106, 108, 111, 112, 168
Cottoidei 108
Cottus 109
  C. sp. 109
Cryptacanthodes 137
  C. aleutensis 137, 138
Cryptacanthodidae 137
Cybiidae 8, 13, 141, 142
Cyclothone 45, 46, 56
  C. solitudinis 45, 46
  C. cf. *C. solitudinis* 45, 46
  C. sp. 46
Cymatogaster 132, 133
  C. aggregata 132, 133
Cynoglossidae 163
Cynoscion 131, 132
  C. eprepes 131
  C. nobilis 131, 132
Cyprinidae 9, 34, 36, 37, 38, 164
Cypriniformes 8, 30, 164
Cyprinodon 166, 167
  C. breviradius 166, 167
Cyprinodontidae 88, 89, 90
Cyprinodontiformes 88, 166
Cyprinodontoidei 88, 166

D

Damalichthys 133, 135
  D. saratogensis 133
  D. vacca 135
Dasceles 58, 59
  D. dassurus 59
Decapterus 117, 118
  D. cf. *D. agilis* 117
  D. hopkinsi 117
  D. sp. 118
  D. (*Lompochites*) *hopkinsi* 117
  D. (*Lompochites*) cf. *D. hopkinsi* 118
Deltistes 31, 32
  D. shoshonensis 31, 32
Deprandidae 13
Deprandus 13
  D. lestes 13
Derrhias 84
  D. enantias 84
Diaphus 52, 53, 54
  D. bolini 52
  D. sp. 54
  D. theta 53, 54
Diastichus 34
  D. macrodon 34
  D. strangulatus 34
Diatomoeca 58, 59
  D. dassurus 59
  D. zatima 58, 59
Diradias 22, 23
  D. aratus 22, 23
  D. fenestralis 22, 23
Drimys 50
  D. defensor 50
Dussumieridae 18
Dussumieriidae 39, 40, 41, 87

E

Eclipes 70, 71, 72, 73
  E. extensus 72
  Eclipes cf. *E. extensus* 72
  E. manni 71, 72
  E. santamonicae 70
  E. sp. 72
  E. veternus 71
Ectasis 12
  E. proriger 12
Electrona 50, 166
  E. crockeri 166
  E. rissoi 50
Elephenoridae 120
Ellimma 29, 30
  E. barbarae 29
  E. elmodenae 29, 30
Elopidae 12
Elopiformes 12
Elops 12
Embiotoca 133
  E. jacksoni 133
Embiotocidae 59, 111, 132, 133, 134, 135
  genus and sp. undet. 135
Emmachaere 78, 79, 122
  E. rhachites 78, 79
  E. rhomalea 78, 79, 122, 123
  E. (*Emmachaere*) *rhomalea* 79, 80
Empetrichthys 89, 90
  E. erdisi 89, 90
Engraulidae 15, 55
Engraulis 15
  E. mordax 15
Engraulites 55

- E. remifer 55, 56
- *Enophrys* 109
  - *E. taurinus* 109
- *Eoscorpius* 106, 112
  - *E. primaevus* 106, 113
- *Eostomias* 48, 49
  - *E. eximius* 48, 49
- *Epelichthys* 19, 20, 21, 22
  - *E. michaeli*s 21, 22
- Epinephelidae 79
- *Epinephelus* 78, 79
  - *E.* (*Emmachaere*) *rhomalea* 78, 79
- *Eriquius* 134
  - *E. plectrodes* 134
- *Erisceles* 134
  - *E. pristinus* 134
- *Eritima* 114, 115
  - *E. evides* 114, 115
- *Escharion* 142
  - *E. townleyi* 142, 143
- *Estringus* 19
- *Etringus* 8, 17, 18, 19, 23
  - *E. scintillans* 17, 18, 19, 23
  - *E.* sp. 19
- *Euleptorhamphus* 84
  - *E. peronides* 84
  - *E.* (*Beltion*) *peronides* 84
- *Euzaphleges* 85, 141
  - *E. longurio* 141
- Euzaphlegidae 85, 141, 144
- *Evesthes* 157, 158
  - *E. hooveri* 157, 158
  - *E. jordani* 157, 158

F

- *Forfex* 87, 88
  - *F. hypuralis* 87, 88
- Forficidae 87, 88
- Fundulidae 88, 89, 166
- *Fundulus* 88, 89, 90, 166
  - *F. curryi* 89, 166
  - *F. davidae* 166
  - *F. eulepis* 88
  - *F.* sp. 89

G

- Gadidae 70, 71, 72, 73, 74
- Gadiformes 60
- *Gadus* 74
  - *G. proximus* 74
- *Ganoessus* 19, 20, 21, 22
  - *G. clepsydra* 20
  - *G. meiklejohni* 20, 21
  - *G. michaelis* 21, 22
- *Ganolytes* 19, 20, 22, 23, 24, 25
  - *G. aratus* 22, 23
  - *G.* cf. *aratus* 22, 23
  - *G. cameo* 23, 24
  - *G.* cf. *G. cameo* 25
  - *G. clepsydra* 20
  - *G.* sp. 25
- Ganolytidae 18, 20, 23
- Gasterosteidae 9, 91, 92, 167
  - Gasterosteidae sp. 92
- Gasterosteiformes 91, 167
- Gasterosteoidei 91, 167
- *Gasterosteus* 8, 91, 92, 167, 168
  - *G. abnormis* 91, 92
  - *G. aculeatus* 8, 91, 92
  - *G.* cf. *aculeatus* 92
  - *G. doryssus* 167, 168
  - *G. orientalis* 91, 92
  - *G.* sp. 92
  - *G. williamsoni leptosomus* 167
- *Genyonemus* 125, 126
  - *G. lineatus* 124, 125, 126
  - *G. whistleri* 124, 125
- *Gila* 35, 36, 37, 38, 164
  - *G. bicolor* 37, 38
    - *G. bicolor mohavensis* 38
  - *G. coerulea* 35
  - *G.* cf. *G. coerulea* 35
  - *G. microlepidota* 164
  - *G.* sp. 35
- *Glyptocephalus* 162
  - *G. zachiru*s 162
  - *G. pacificus* 162
- Gobiesocidae 139
- Gobiesocoidei 139
- Gobiidae 139, 169
- Gobioidei 139
- *Gobius* 139, 140, 169
  - *G. lepidus* 139, 140
  - *G. nicholsii* 140
  - *G. oblongus* 169
- Gonorhynchidae 12
- Gonostomatidae 39, 45, 46
- Gonostomatoidei 45
- Goodeidae 89, 90
- *Gymnothorax* 13
  - *G. mordax* 13

H

Halichoeres 135, 136
 H. californicus 136
 H. semicinctus 135
Halosauridae 8, 13, 14
Hayia 112, 113
 H. daulica 112, 113
Hemicaranx 118
 H. archaeus 118, 119
Hemiramphidae 84, 85, 86, 87
Hexagrammidae 107, 108, 138
 genus and sp. undet. 108
Hexagrammoidei 107
Hexagrammos 107
 H. achrestus 107
Hippoglossoides 156, 161
 H. exilis 161
 H. pristinus 161
 H. (*Isomma*) *pristinus* 161
Hippoglossus 156
 H. antiquus 156
 H. californicus 156
Hipposyngnathinae 92
Hipposyngnathus 92, 93
 H. imporcitor 92, 93, 94
Homeocoryphaenoides 61, 62
 H. chiasmacanthus 61, 62
Homeomacrurus 65
 H. fernandensis 65
Homeonezumia 67, 68
 H. multispinosus 67, 68
Hygophum 51
 H. sp. 51
Hysterocarpus 134, 135
 H. traskii 134
 H. cf. *H. traskii* 134, 135

I

Icelinus 109, 110, 168, 169
 I. burchami 168, 169
 I. fimbriatus 109, 110
 I. quadriseriatus 110
 I. tenuis 110
 I. filamentosus 109
Ioscion 132
 I. morgani 132
Ioscionidae 132
Irifera 145, 146, 147
 I. ringens 146, 147
Isomma 161
 I. pristina 161
 I. pristinum 161
Istiophoridae 154, 155, 156
Istiophorus 154
 I. calvertensis 154
 I. platypterus 154

J

Johnius 131, 132
 J. nobilis 131, 132
Julius 135
 J. semicinctus 135

K

Klamathella 35, 36
 K. coerulea 35

L

Labridae 29, 135
Labrus 136
 L. pulcher 136
Lampadena 54
Lampanyctinae 52, 53, 55, 58
Lampanyctus 52, 53, 54, 55, 56, 57
 L. bolini 52, 53
 L. petrolifer 54, 55
 L. remifer 55
 L. regalis 55
 L. resplendens 57
 L. ritteri 56
 L. sp. 56
Lampridae 58, 59
Lampriformes 58
Lampris 58, 59
 L. zatima 58, 59
 L. (*Diatomoeca*) *zatima* 58, 59
Lavinia 35, 36
Laytonia 8, 13, 14
 L. californica 8, 13, 14
 L. cf. *L. californica* 14
 L. sp. 14
 L.? zemorrensis 14, 15
Leiostomus 124, 125
 L. lineatus 124, 125
Lembicus 19, 20, 21, 23
 L. meiklejohni 20, 21, 23
Lepidogobius 139
 L. lepidus 139
Lepidophanes 54
 L. petrolifer 54
Leptacanthichthys 80

L. cf. *gracilispinis* 80
Leptacantholepidus 63, 64, 65
  L. delmontianus 63, 64
  L. rotundus 63, 64, 65
Leptocottus 110
  L. armatus 110, 111
Leptolepidae 17
Leptolepididae 17
Lestichthys 84
  L. porteousi 84
Lethops 140
  L. connectens 140
Leuciscus 36, 37
  L. reddingi 36, 37
Leucus 34
  L. latus 34
Leuresthes 82
  L. tenuis 82
Linophryne 81
  L. cf. *L. indica* 81
Linophrynidae 80, 81
Liparidae 139
Lirosceles 111
  L. elegans 111
Lompochites 117
  L. hopkinsi 117
Lompoquia 129, 130, 131
  L. culveri 130
  L. cf. *L. culveri* 130
  L. retropes 129
  L. sp. 130
Lophar 116, 117
  L. miocaenus 116, 117
Lophiidae 78, 79
Lophiiformes 78
Lophioidei 78
Lutjanus 106
  L. hagari 106
Luvaridae 153
Luvarus 153
  L. sp.: 153
Lygisma 39, 50
  L. tenax 39, 50
Lycodes 137
  L. pacificus 137
Lycodopsis 137
  L. pacifica 137
Lyconectes 137
  L. aleutensis 137
Lyopsetta 161, 162
  L. exilis 161, 162

M

Macrouridae 61, 66, 67
Macruridae 61, 62, 63, 65, 66, 67
Makaira 155, 156
  M. nigricans 155
  M. sp. 155, 156
Malacocottus 112
  M. zonurus 112, 125
Megalopidae 12, 13
Megalops 12
  M. vigilax 12
Melamphaes 167
  M. bispinosus 167
  M. lugubris 167
Melamphaidae 90, 91, 167
  genus and sp. undet. 91
Merlangus 69
  M. productus 69
Merlucciidae 68
Merluccius 69
  M. productus 69
Merriamella 167, 168
  M. doryssa 167, 168
Merriamina 71
  M. ectenes 71
Microgadus 74
  M. proximus 74, 75
Microstomatidae 38
Microstomus 162, 163
  M. pacificus 162, 163
Molidae 164
  genus and sp. undet. 164
Moridae 60
  genus and sp. undet. 60
Mugil 81
  M. cephalus 81
Mugilidae 81
  genus and sp. undet. 81
Mugiliformes 81
Muraena 13
  M. mordax 13
Muraenidae 13
Muraenisocidae 13
Muraenoidei 13
Myctophidae 50, 55, 58, 165
Myctophiformes 50, 165
  genus and sp. undet. 91
Myctophinae 50, 53
Myctophum 51, 52, 55, 57, 58, 165
  M. californiense 51

- *M. leucopsarum* 57
- *M. mexicanum* 58
- *M. nitidulum* 165
- *M. regale* 55
- *M.* sp. 51

N

Neomaenis 106
- *N. hagari* 106

Neopterygii 12
Notacanthoidei 13
Notoscopelus 57
- *N. resplendens* 57

O

Ocystias 150
Ogcocephaloidei 80
Oligobelis 36
- *O. arciferus* 36
- *O. laminatus* 36

Oncorhynchus 42, 43, 44, 45
- *O. clarki* 45
- *O. lacustris* 44
- *O. mykiss* 45
- *O. rastrosus* 42, 43
- *O.* "*Smilodonichthys*" *rastrosus* 42, 43
- *O.* (*Smilodonichthys*) *rastrosus* 42, 43

Oneirodes 80
- *O.* sp. 80

Oneirodidae 80
Ophidiidae 75
Ophidiiformes 75
Ophidion 75, 76
- *O. ozymandia*s 76, 77
- *O. scrippsae* 76
- *O. taylori* 75, 76

Ophiodon 153
- *O. ozymandias* 153

Ophiodontidae 77, 153
Opisthonema 25
- *O. palosverdensis* 25

Orthodon 36, 164, 165
- *O. microlepidotus 164*
- *O.* cf. *O. microlepidotus* 164, 165
- *O.* sp. 36

Osmeridae 42
Osmerus 42
- *O. starksi* 42

Otolithidae 132
Otophidion 76
- *O. scrippsi* 76

Otophidium 75, 76
- *O. scrippsae* 76
- *O. scrippsi* 76
- *O. taylori* 75, 76

Oxyjulis 136
- *O. californica* 136

Ozymandias 77, 153, 154
- *O. gilberti* 77, 153, 154

P

Parafundulus 89, 90
- *P. erdisi* 89, 90

Paralepidae 50, 144
Paralepididae 50
Paralichthyidae 156
Paralichthys 156, 157
- *P. antiquus* 156, 157
- *P. californicus* 156
- *P.* sp. 157
- *P.* (*Vorator*) *antiquus* 156

Paralabrax 113
- *P.* sp. 113

Parophrys 163
- *P. vetulus* 163

Parvilux 165
- *P. ingens* 165

Perciformes 113, 169
Percoidei 113
Pholidophoridae 18, 20, 23
Phosichthyoidei 48
Physiculus 60
- *P. rastrelliger* 60

Pimelometopon 136
- *P. pulchrum* 136

Platysomatichthys 170
- *P. stomias* 170

Plectrites 121, 122
- *P. classeni* 121, 122

Pleuronectidae 59, 160, 169
Pleuronectiformes 156, 169
Pleuronichthys 160
- *P. veliger* 160
- *P.* (*Zororhombus*) *veliger* 160

Pneumatophorus 146, 147
- *P.* cf. *grex* 146, 147
- *P.* cf. *P. grex* 146, 147

Pogonias 126
- *P. stringeri* 126

Pomatomidae 115, 116, 117

Porichthys 77, 78
    P. notatus 77, 78
    P. myriaster 78
Progadus 73, 74
    P. miocenicus 73, 74
    P. pliocenicus 73
Promacrurus 65, 66, 67
    P. newmani 66
    P. saucesianus 66, 67
    P. zemorrianus 65, 66
Promerluccius 68, 69
    P. venturaensis 68, 69
Protanthias 113, 114
    P. fossilis 113, 114
Protomyctophum 165, 166
    P. crockeri 165, 166
Psettichthys 158
    Psettichthys sordidus 158
Pseudoseriola 115, 116
    P. gilliandi 115
    P. sanctaeineziae 116
    P. sp. 116
Ptychocheilus 36, 37
    P. arciferus 37
    P. cf. *P. arcifer* 36, 37
    P. cf. *P. arciferus* 36, 37
Psychrolutidae 112
Pungitius 91, 92
    P. haynesi 91, 92

Q

Quaesita 39, 40, 41
    Q. alhambrae 41
    Q. fragilis 41
    Q. quisquilia 40, 41
    *Q. quiescen*s 39
Quisque 26
    Q. gilberti 26

R

Radulinus 111
    R. asprellus 111, 112
Rathbunella 136, 137
    R. hypoplecta 136, 137
Rhabdofario 44
    R. lacustris 44
    R. cf. *R. lacustris* 44
Rhacochilus 135
    R. vacca 135
Rhinogobiops 140
    R. nicholsii 140
Rhomarchus 105
    R. ensiger 105
Rhomurus 87
    R. fulcratus 87
Rixator 99, 100, 101, 103
    R. ineziae 99, 100, 101, 103
    R. porteousi 99, 100, 101
Rogeniidae 84
Rogenio 45, 46, 85
    R. bowersi 84, 85
    R. solitudinis 45, 46
    R. vanclevi 46
Rogenites 84, 85
    R. bowersi 84, 85
Roncador 126
    R. stearnsii 126
Rythmias 121, 122, 123, 124
    R. gaviotae 6, 123, 124
    R. sp. 124
    R. starri 121, 122, 123

S

Salmo 44
    S. copei 44
Salmonidae 9, 42, 43
Salmoniformes 42
Sarda 148, 149
    S. cf. *S. stockii* 149
    S. cf. *stockii* 148, 149
    S. stockii 148, 149
    S. chiliensis 148
        S. chiliensis lineolata 148
    S. sp. 149
Sciaenidae 117, 124
Scomber 145, 146, 147, 148, 150
    S. japonicus 146, 147, 150
    S. cf. *japonicus* 146
    S. sanctae-monicae 145
    S. sanctaemonicae 145, 146, 147
    S. sp. 148
Scomberesocidae 86
Scomberesox 86, 87
    S. edwardsi 86
Scomberessus 86, 87
    S. acutillus 86, 87
    S. edwardsi 86
Scomberosocidae 88
Scombridae 141, 142, 145, 153
Scombroidei 8, 141

- Scombrosarda 145
- *Scopelogadus* 90, 91, 167
  - *S. bispinosus* 167
  - *S.* (?) *capistranensis* 90, 91
- *Scopelus* 50
  - *Scopelus risso* 50
- *Scorpaena* 105, 106
  - *S. ensiger* 105, 106
  - *S.* sp. 106
- Scorpaenidae 96, 98, 99, 100, 101, 102, 103, 105, 106, 168
  - Scorpaenidae sp. 106
- Scorpaeniformes 96, 168
- Scorpaeninae 105
- Scorpaenoidei 96, 168
- *Sebastavus* 168
  - *S. elatus* 168
  - *S. vertebralis* 168
- *Sebastes* 96, 97, 98, 99, 100, 101, 102, 103, 104
  - *S. apostates* 96, 97, 98
  - *S. davidi* 97, 98
  - *S. defunctus* 6, 98, 100
  - *S. goodei* 98
  - *S. ineziae* 99, 100, 102
  - *S. longirostris* 100, 101
  - *S. paucispinis* 104
  - *S. porteousi* 100, 101, 102, 103
  - *S. rosae* 104
  - *S.* sp. 104, 105
  - *S. thermophilus* 102
  - *S. velox* 100, 103
  - *S.* (*Sebastinus*) *ineziae* 100
  - *S.* (*Sebastinus*) *longirostris* 100
  - *S.* (*Sebastodes*) *apostates* 96, 97
  - *S.* (*Sebastodes*) *davidi* 97
  - *S.* (*Sebastodes*) *defunctus* 98
  - *S.* (*Sebastodes*) *ineziae* 99
  - *S.* (*Sebastodes*) *porteousi* 101
  - *S.* (*Sebastodes*) *thermophilus* 102
  - *S.* (*Sebastodes*) *velox* 103
- Sebastidae 96, 98, 100, 101, 102
- Sebastinae 96, 104, 168
- *Sebastinus* 98, 99, 100, 101, 103, 105
  - *S. ineziae* 98, 99, 100, 101, 102, 103
  - *S. longirostris* 100
  - *S.* sp. 105
- *Sebastodes* 96, 97, 98, 99, 101, 102, 103, 104
  - *S. apostates* 102
  - *S. goode*i 98, 99
  - *S.* aff. *S. elongatus* 104, 105
  - *S. rosa*e 104
  - *S.* (?) *rosae* 104
  - *S.* sp. 104
  - *S.* (*Rixator*) *porteousi* 101, 102, 103
  - *S.* (*Sebastinus*) *ineziae* 97, 98, 99, 101, 103
  - *S.* (*Sebastoessus*) *apostates* 96
  - *S.* (*Sebastoëssus*) *apostates* 102
- *Sebastoessus* 96, 97, 101, 102
  - *S. apostates* 96, 97
  - *S. haroldi* 101, 102
- *Semicossyphus* 136
  - *S. pulcher* 136
- *Semotilus* 36
  - *S. bairdii* 36
  - *S. posticus* 36
- *Seriola* 116, 118, 119
  - *S. sanctae-barbarae* 118, 119
  - *S. sanctaebarbarae* 118
  - *S. sanctaeineziae* 116
  - *S.* sp. 119
- Seriolidae 116
- *Seriphus* 127, 128, 131
  - *S. lavenbergi* 127, 131
  - *S. politus* 127, 128
- Serranidae 79, 113
- *Sigmopharyngodon* 34, 35
  - *S. hagermanensis* 35
  - *S. idahoensis* 34, 35
- *Siphateles* 37, 38
  - *S. bicolor* 37
  - *S. davidgainesi* 38
  - *S. mohavensis* 38
  - *S.* sp. 38
- *Smilodonichthys* 42, 43
  - *S. rastrosus* 42, 43
- *Smithites* 41
  - *S. elegans* 41
- Sparidae 121, 134
- *Sphoeroides* 164
  - *S.* sp. 164
- *Sphyraena* 144
  - *S. argentea* 144
- Sphyraenidae 144
- *Spirinchus* 42
  - *S.* sp. 42
  - *S. starksi* 42
- *Squalius* 36, 37
  - *S. arciferus* 36
  - *S. bairdi* 36, 37
  - *S. laminatus* 36
  - *S. posticus* 36, 37
  - *S. reddingi* 36, 37

Starrias 12, 13
  S. ischyrus 12, 13
Stenobrachius 57
  S. leucopsarus 57, 58
Stephanoberyciformes 90, 167
Stereolepis 106
Sternbergia 40, 41
  S. waitei 40, 41
Sternoptychidae 47, 48
Stomiatidae 48
Stomiidae 48, 50
Stomiiformes 45
Symbolophorus 51
  S. californiense 51
  S. californiensis 51
  S. sp. 51
Symphurus 163
  S. atricauda 163
  S. sp. 163
Syngnathidae 92, 94, 95, 96
Syngnathoidei 92
Syngnathus 93, 94, 96, 145
  S. avus 93, 94, 95, 145
  S. californiensis avus 95
  S. emeritus 94
  S. helmsi 96
  S. sp. 96

T

Tarletonbeania 51
  T. crenularis 51
Teleostei 12
Tetraodontidae 164
Tetraodontiformes 163
Tetraodontoidei 164
Thrysion 22, 145
  T. velox 22
Thunnidae 148, 149
Thunnus 150, 152, 153
  T. starksi 150, 152
  T. sp. 153
Thynnus 145
  T. propterygius 145
Thyroscles 143
  T. escharion 143
Thyrsion 22, 141, 142, 146
  T. velox 22, 141, 142, 143, 146, 147
Thyrsites 142
  T. kriegeri 142
Thyrsocles 141, 142, 143
  T. escharion 142, 143
  T. kriegeri 141, 142, 143
  T. velox 142
Tigoma 37
  T. bicolor 37
Totoaba 128
  T. fitchi 128
Trachichthyidae 114, 115
Trachurus 119
  T. symmetricus 119
Triphoturus 58
  T. mexicanus 58
Trossulus 143, 144
  T. exoletus 143, 144
Tunita 150, 151, 152
  T. octavia 150, 151
  T. sp. 152
Turio 130, 145, 146
  T. culveri 130, 146, 147
  T. wilburi 146, 147, 150

V

Vorator 156
  V. antiquus 156
  V. (= *Hippoglossoides*) *antiquus* 156

X

Xeneretmus 169
Xenothrissa 22, 23
  X. aphrasta 22, 23
Xestias 150, 151, 152, 153
  X. iratus 150, 151, 152, 153
Xiphias 154
  X. platypterus 154
Xiphioidei 8, 154
Xyne 26, 27, 28, 29
  X. barbarae 29
  X. elmodenae 29
  X. fitgeri 26, 27, 28
  X. grex 26, 27, 28, 29, 30
Xyrauchen 33, 34
  X. texanus 33, 34
Xyrinius 28, 29, 30
  X. barbarae 29
  X. elmodenae 29, 30
  X. houshi 28, 29

Z

Zanteclites 82, 83
  Z. hubbsi 82, 83

- *Z.* sp. 83
- *Zaphleges* 12, 13, 85, 141
  - *Z.* cf. *longurio* 141, 142
  - *Z. longurio* 85, 141
  - *Z. vigilax* 12, 13
- Zaphlegidae 130, 141, 142, 143, 144
- *Zaphlegulus* 143, 144
  - *Z. venturaensis* 143, 144
- Zaproridae 138, 139
- *Zelosis* 85, 88
  - *Z. hadleyi* 85, 88
- *Zelotes* 88
  - *Z. alhambrae* 88
- *Zelotichthys* 85, 88
  - *Z. alhambrae* 85, 88
- *Zemiagrammus* 138
  - *Z. isistius* 138, 139
- Zoarcidae 137
- Zoarcoidei 136
- *Zororhombus* 160
  - *Z. veliger* 160

Geographic and Stratigraphic Index

A

- Alaska 112, 169
- Austria 10, 60, 168, 169
  - Vienna Basin 169

C

- California (All pages)
  - Contra Costa County 43
  - Imperial County 34
  - Inyo County 33, 37, 38, 89, 166, 167
  - Kern County 11, 14, 15, 19, 28, 30, 51, 54, 56, 57, 61, 62, 63, 65, 66, 67, 83, 96, 116, 118, 119, 124, 126, 128, 142, 153, 155, 164
  - Kings County 11, 42
  - Lake County 92, 114, 134, 135, 165
  - Lassen County 31, 32, 33, 35, 36, 37, 38, 45, 109
  - Los Angeles County 3, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 28, 29, 38, 39, 40, 41, 42, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 102, 104, 105, 106, 108, 112, 113, 114, 115, 116, 117, 118, 119, 120, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 135, 137, 138, 139, 140, 143, 145, 146, 147, 148, 149, 153, 156, 158, 159, 162, 163, 164, 165, 166, 167, 169, 170
    - Santa Monica Mountains 17, 18, 19, 23, 24, 25, 28, 39, 40, 41, 45, 53, 54, 56, 71, 73, 86, 87, 95, 102, 105, 106, 117, 118, 120, 121, 122, 130, 131, 139, 146, 148, 149, 150
  - Modoc County 32, 33, 35, 37, 45
  - Mono County 32, 33, 36, 37, 38
  - Monterey County 22
  - Orange County 10, 11, 13, 14, 15, 17, 19, 20, 26, 29, 39, 40, 50, 51, 52, 53, 55, 56, 57, 58, 60, 69, 70, 71, 74, 76, 83, 85, 86, 90, 91, 94, 95, 104, 105, 106, 111, 112, 119, 128, 133, 137, 146, 147, 150, 155, 162, 163, 164, 168
  - Riverside County 91
  - San Bernardino County 10, 89, 92, 166
  - San Diego County 43, 51, 52, 53, 57, 60, 76, 125, 132, 140, 154, 155, 156
  - San Francisco 1, 2, 9, 10, 15, 42, 74, 75, 77, 81, 82, 108, 110, 119, 124, 127, 132, 133, 140, 156, 158, 162, 163, 170, 183
  - San Joaquin Valley 15, 19, 28, 30, 61, 62, 66, 67, 83, 116, 124, 142, 153
  - San Luis Obispo 14
  - San Luis Obispo County 104
  - San Mateo County 153, 157
  - Santa Barbara County 13, 14, 22, 27, 29, 39, 40, 42, 46, 47, 48, 49, 50, 55, 58, 59, 60, 61, 71, 77, 78, 84, 87, 92, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 105, 107, 108, 111, 113, 116, 117, 118, 119, 122, 123, 129, 130, 131, 132, 134, 138, 139, 141, 142, 143, 144, 146, 147, 150, 153, 156, 157, 158, 160, 161, 164
    - Lompoc 7, 9, 13, 22, 27, 28, 39, 40, 41, 46, 47, 48, 49, 50, 55, 58, 59, 61, 71, 72, 77, 79, 84, 92, 94, 97, 98, 100, 101, 102, 103, 105, 108, 111, 114, 116, 118, 119, 122, 123, 130, 131, 132, 134, 139, 142, 143, 145, 147, 149, 150, 152, 153, 154, 156, 158, 161, 162
  - Santa Clara County 36, 133
  - Stanislaus County 36, 43

  - Ventura County 49, 68, 73, 91, 92, 122, 143, 164
- Canada 10, 140
  - British Columbia 140
- Chile 154

E

- Eocene 15, 62, 89, 166, 167
  - Late Eocene 89, 166, 167
    - Titus Canyon Formation 89, 166, 167
- Eocene-Oligocene 15, 62
  - Bastendorff Formation 15
  - Keasey Formation 62

F

- France 10, 155
  - Bay of Biscay 155

H

- Hawaiian Islands 165

I

- Idaho 31, 32, 34, 35, 36, 37, 43, 44, 45
  - Owyhee County 34, 35, 36, 43, 44, 45
  - Twin Falls County 35
- Italy 50, 155

M

- Mexico 13, 15, 58, 60, 76, 135, 155, 159, 164, 165
  - Baja California 13, 58, 60, 76, 135, 155, 159, 164, 165
    - Baja California Sur 155
- Mio-Pliocene 89, 90, 154, 155
  - Bahía Inglesa Formation 154
  - Posey Canyon Shale Member, Peace Valley Formation 89, 90
  - Trinidad Formation 155
- Miocene 8, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 65, 66, 67, 70, 71, 72, 73, 77, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 111, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 126, 127, 128, 129, 130, 131, 132, 134, 135, 136, 138, 139, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 153, 154, 155, 156, 157, 158, 159, 160, 161, 163, 164, 168, 169
  - Altimira shale 25, 135
  - Lompoc diatomite 27
  - Early Miocene 14, 15, 19, 30, 61, 62, 66, 67, 83, 126, 128
    - Temblor Group 126, 128
      - upper Olcese Sand 126, 128
  - Late Miocene 11, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 52, 53, 54, 55, 56, 58, 59, 60, 61, 63, 65, 70, 71, 72, 73, 77, 78, 80, 81, 82, 83, 84, 85, 86, 87, 89, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 111, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 127, 129, 130, 131, 132, 134, 138, 139, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 153, 154, 155, 156, 157, 158, 160, 161, 163, 164, 168, 169
    - Capistrano Formation 11, 155
      - Oso Member 155
    - Chalk Hills Formation 43
    - Eastover Formation 154, 155
    - McLure shale 83
    - Modelo Formation 14, 17, 18, 19, 23, 24, 25, 28, 39, 40, 41, 45, 46, 47, 48, 49, 52, 53, 54, 56, 70, 71, 72, 73, 83, 86, 87, 93, 94, 95, 96, 102, 104, 105, 106, 115, 116, 117, 118, 120, 122, 129, 130, 131, 138, 143, 145, 146, 147, 148, 149, 164
      - Upper Modelo Formation 48, 49, 73, 93, 94
    - Monterey Formation 11, 13, 19, 20, 21, 22, 25, 26, 27, 29, 39, 40, 46, 47, 48, 49, 50, 55, 58, 59, 61, 71, 77, 78, 83, 84, 85, 86, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 105, 106, 107, 108, 111, 113, 114, 116, 117, 118, 119, 122, 123, 129, 130, 131, 132, 134, 138, 139, 141, 142, 143, 144, 146, 147, 148, 150, 153, 155, 156, 157, 158, 160, 161, 164, 168, 169
      - Buttle Member 21
      - Valmonte Diatomite Member 47
    - Peace Valley Formation 89, 90, 92
      - Osito Canyon Shale Member 92
      - Posey Canyon Shale Member, 89, 90
    - Puente Formation 11, 18, 20, 21, 24, 25, 28, 29, 38, 42, 46, 48, 49, 56, 58, 60, 80, 81, 82, 83, 94, 113, 115, 118, 124, 127, 131, 143, 147, 148, 149, 163, 164
    - Ringold Formation 43

San Mateo Formation 43, 155
Truckee Formation 168
Truckee Canal, middle Member 168
Middle Miocene 11, 19, 44, 48, 51, 54, 56, 57, 72, 83, 92, 96, 106, 118, 119, 153, 155, 156, 158, 160, 161, 164
Agnevo Formation 92
Monterey Formation 19, 72, 92, 153
Altamira shale Member 19, 72, 92, 153
Round Mountain Silt 11, 51, 54, 56, 57, 164
Topanga Formation 164
Middle-Late Miocene 18, 19, 24, 25, 28, 63, 83, 106, 116, 118, 124, 130, 131, 142, 148, 149
Upper Miocene 46, 169

N

Nevada 92, 168
North Carolina 154, 155, 156

O

Oligocene 14, 15, 62
Oregon 10, 15, 33, 35, 37, 43, 62, 69, 75, 183
Jefferson County 43

P

Paleocene 145
Pleistocene 7, 8, 11, 13, 15, 16, 17, 31, 32, 33, 34, 35, 36, 37, 38, 42, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 69, 70, 74, 75, 76, 77, 78, 81, 82, 91, 92, 99, 104, 105, 108, 109, 110, 111, 112, 114, 119, 125, 126, 127, 128, 132, 133, 134, 135, 136, 137, 138, 139, 140, 146, 156, 158, 159, 162, 163, 165, 166, 167, 169, 170
Hagerman Formation 35
Lomita Marl 15, 17, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 70, 75, 76, 78, 111, 112, 119, 125, 128, 132, 137, 138, 139, 140, 162, 165, 166, 167, 169, 170
Lomita Marl Formation 78, 119, 125, 128, 132, 137, 162, 167, 169, 170
Lower Lake Formation 114, 165
Santa Barbara Formation 42, 60
Plio-Pleistocene 8, 11, 15, 17, 33, 34, 35, 36, 37, 38, 50, 51, 52, 53, 55, 56, 57, 60, 69, 74, 76, 77, 78, 82, 91, 92, 104, 108, 111, 112, 114, 119, 125, 126, 128, 133, 134, 135, 137, 140, 146, 156, 158, 159, 162, 163, 165
Cache Formation 92, 114, 134, 135, 165
Pico Formation 8, 15, 17, 50, 51, 52, 53, 57, 60, 69, 119, 146
Santa Clara Formation 36, 133
Tulare Formation 11, 42
Pliocene 7, 8, 11, 12, 13, 15, 16, 17, 31, 32, 33, 34, 35, 36, 37, 38, 40, 42, 43, 44, 45, 51, 52, 53, 54, 55, 56, 57, 58, 60, 65, 68, 69, 70, 73, 74, 75, 76, 77, 78, 81, 82, 89, 90, 91, 99, 104, 105, 108, 109, 110, 111, 112, 119, 125, 126, 127, 128, 132, 133, 135, 136, 137, 138, 139, 140, 144, 146, 153, 154, 155, 156, 157, 158, 159, 160, 162, 163, 165, 166, 167, 169, 171
Alturas Formation 31, 32, 33, 35, 36, 37, 38, 45, 109
Diablo Formation 34
Glenns Ferry Formation 31, 34, 35, 36, 44
Posey Canyon Shale Formation (see Posey Canyon Shale Member)
Posey Canyon Shale Member, Peace Valley Formation 89, 90
Early Pliocene 7, 8, 11, 12, 31, 34, 35, 37, 44, 45, 65, 68, 73, 109, 154, 155, 156
Fernando Formation 7, 8, 9, 12, 15, 16, 50, 51, 52, 53, 55, 56, 57, 58, 60, 69, 70, 74, 76, 77, 78, 82, 104, 108, 111, 112, 119, 125, 126, 128, 131, 133, 135, 137, 140, 146, 156, 158, 159, 162, 163
Fernando Formation (Los Angeles County) 15, 51, 69, 75, 76, 78, 82, 105, 108, 125, 127, 128, 133, 135, 140, 146, 157, 159, 160, 162, 163
Fernando Formation (Orange County) 15, 16, 50, 51, 52, 53, 55, 56, 57, 58, 60, 70, 75, 76, 105, 112, 120, 128, 133, 137, 146, 162, 163
Repetto Member 7, 12
Upper Fernando Formation 15, 16
Yorktown Formation 154, 155, 156
Late Pliocene 7, 8, 32, 33, 35, 36, 37, 38, 51, 52, 53, 57, 58, 60, 70, 75, 76, 89, 90, 104, 125, 132, 140, 153, 154, 155, 165, 166, 169
Purisima Formation 153, 157
San Diego Formation 51, 52, 53, 57, 60, 76, 125, 132, 140, 154
Mid-Late Pliocene 35, 37, 89, 90
Peace Valley Formation 89, 90
Posey Canyon Shale Member 89, 90
Mid-Pliocene 31, 32, 33, 35, 36, 37, 38, 156, 157
Deguynos Formation 156
Yuha Member 156

R

Russia 10, 16, 92, 139
  Kamchatka 16, 92, 139
  Sakhalin Island 92

S

Spain 155

V

Virginia 10, 154, 155

W

Washington 10, 35, 37, 43, 69, 108, 135, 183
  Puget Sound 108, 135